

DETERMINING THE USE OF PRINCIPLES OF ADULT LEARNING IN
PROFESSIONAL DEVELOPMENT

By

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TABLE OF CONTENTS

	page
ACKNOWLEDGMENTS.....	ii
ABSTRACT	vii
CHAPTER	
1 INTRODUCTION	1
Statement of the Problem	7
Purpose of the Study	8
Significance of the Study	9
Research Questions	10
Definition of Terms.....	10
Assumptions of the Study	11
Limitations of the Study	12
Organization of the Dissertation.....	12
2 REVIEW OF RELATED LITERATURE.....	13
Historical Overview of Professional Development	13
Purpose of Professional Development.....	17
Principles for Professional Development.....	20
The Concerns-Based Adoption Model.....	22
Professional Development in Mathematics.....	24
Principles Common to Most Programs for Professional Development.....	26
Models in Professional Development for Teacher Education	27
The Individually Guided Professional Development Model	28
The Observation and Assessment Professional Development Model	29
The Model of Involvement in a Development/Improvement Process	30
The Training Model	31
The Action Research Professional Development Model	33
Levels of Professional Development Evaluation.....	34
Historical Overview of Adult Education	36

Basic Assumptions of Adult Learning	38
Principles of Teaching Adults.....	43
The Andragogical Model.....	44
Summary	49
3 RESEARCH METHODOLOGY.....	50
Introduction	50
Research Questions	50
Documents.....	51
PALS Survey.....	52
Participants' Written Evaluation of Training.....	54
Implementation Action Plans.....	55
Qualitative Research	56
Research Design	58
Sampling and Description of the Subject	59
Data Analysis	61
Validity and Reliability	64
Internal Validity.....	64
Validity and Reliability of the PALS	64
External Validity.....	66
Reliability	67
Investigator Bias.....	67
Ethical Issues.....	68
Summary	69
4 DATA ANALYSIS AND RESULTS.....	70
Introduction	70
Data Collection	72
Description of the Respondents.....	72
Years of Teaching Experience	73
Level of Education	74
Analysis of Research Question #1.....	75
Analysis of PALS Surveys	75
Participants' Written Evaluation of the Training	79
Analysis of Participants' Plans to Implement	83
Analysis of Research Question #2.....	85
Summary	86
5 DISCUSSIONS AND RECOMMENDATIONS	89
Summary	89
Findings and Discussions	89
Implications.....	94
Recommendations for Further Research.....	96

Recommendations for Practice.....	97
Summary	98
APPENDIX	101
A DESCRIPTION OF PROJECT A	101
B EFFECTIVE INSTRUCTIONAL PRACTICES CRITERIA	103
C PRINCIPLES OF ADULT LEARNING SCALES (PALS).....	105
D TRAINING EVALUATION FORM	108
 REFERENCES.....	109
BIOGRAPHICAL SKETCH.....	115

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The study of a typical algebraic thinking training session by a professional development project in the state of Florida provided the opportunity to evaluate professional development for teachers and determine whether participants experienced a learner-centered training or a teacher-centered training. The study determined which of the following factors generally accepted in teaching adults the participants perceived to be used by trainers: learner-centered activities, personalizing instructions, relating teaching to student experience, assessing participant needs, climate-building, student participation in the learning process, and flexibility for personal development by students. Additionally, the research conducted in this study determined whether there was a relationship between the years of teaching experience, the level of education of the participants and the perception by the participants that they had been taught using the adult learning principles.

A case study approach with descriptive methods of data collection was employed. In this study 25 elementary and secondary teachers from different areas in the state certified to teach mathematics, special education, and elementary education attended an algebraic thinking training session. This study analyzed participants' written evaluations of the training sessions, action plans developed to implement the new knowledge, and a Principles of Adult Learning Scale (PALS) survey. The PALS helped determine whether participants perceived the training to be teacher-centered or learner centered. The PALS also provided the participants' perceptions of the use of factors generally accepted in teaching adults.

The results of this study indicated that participants perceived the training to be more learner-centered than they had expected, although the overall perception was that the training was teacher-centered. The majority of participants perceived one factor to be consistently used by trainers throughout the training session: relating to participants' experiences. This study also showed a strong indication that those participants with ten or more years of teaching perceived the training to be learner-centered, while participants with fewer than ten years of teaching experience perceived the training to be teacher-centered. The study did not determine if there was a relationship between the highest level of education and the perception that the training used factors generally accepted in teaching adults.

CHAPTER 1 INTRODUCTION

Rationale

Historically, professional development for teachers has been fragmented, non-engaging, and usually unrelated to increasing student learning (Guskey, 1986, 2000). In the 1980s, the report, entitled *A Nation at Risk* called for improvement in teacher education and re-training, so that teachers could become learning facilitators to help improve student learning. A suggested avenue for re-training teachers was through professional development opportunities. In nearly every proposal for improving education, high-quality professional development was considered a central component (Guskey 1986, 2000).

Professional development was an avenue by which schools attempted to achieve reform and increase student achievement (Fullan, 1991; Joyce & Showers, 1995; Little, 1997). Without sustained professional development and leadership support, many recommended practices used in schools could not be implemented. Any effort to implement school reform called for careful planning, implementation, and monitoring professional development. Professional development efforts often have failed because insufficient attention was paid to establishing a social organization that was congenial to change and growth (Fullan & Stiegelbauer, 1991). Review of related literature suggested that active and sustained explorations of larger ideas and concepts were the likeliest way to

bring about changes in teaching and learning. Change happened one classroom at a time, in one department at a time until ideally, the whole school had established an environment of sustained learning and change. Professional development that incorporated principles of change developed the concept of change as a process, not an event (Hord et al., 1998).

All public school teachers participated in some form of professional development, but few had experiences that promoted significant and sustained professional learning (Hirsch, Koppich, and Knapp, 2000). Traditionally, professional development for teachers has consisted of short sessions where teachers received prescriptive materials to bring back to the classroom. Many professional development programs for teachers have been characterized by content not related to student learning and without linkages to school improvement efforts or emphasis on ongoing support for teachers (Little, 1997; Sparks & Loucks-Horsley, 1989).

Expert in adult learning theory (Knowles, 1980) have written that trainers knowledgeable in the principles of andragogy, the art and science of helping adult students (as opposed to children) learn, have been a powerful tool to promote change in teachers who, when they participated in professional development, were adult students. Knowles (1980) proposed several guiding principles of andragogy.

One of the guiding principles of andragogy in professional development has been to enable adults to acquire new knowledge and skills and to transfer that knowledge and those skills to active classroom practice (Friend & Cook,

2000; Joyce & Showers, 1998). To implement this principle, trainers facilitated learning situations that integrated new ideas into existing knowledge.

A second guiding principle of andragogy in professional development has been to assess specific needs of individuals and groups (Friend & Cook 2000; Joyce & Showers 1988). To achieve this principle, trainers facilitated activities that built success incrementally and helped learners become more effective and competent.

A third guiding principle of andragogy was that professional development opportunities must have involved learners in situations that were practical and resulted in them being able to solve problems. To achieve the goal of the third principle, research suggested that problem-solving and the context in which the learning was set became increasingly important as the age of the adult learner increased (Tennant & Pogson, 1995).

Knowles' (1984) theory of andragogy proposed that teaching adults was a unique area of education that required specialized training. Knowles developed this theory in response to what he perceived to be the misguided practice of applying the principles of teaching children when conducting educational programs for adults. Subsequently, Brookfield (1986), Conti (1989a), and Knowles (1980) concurred that andragogy could be beneficial as a teaching technology for use with adults.

As of 2004, teachers in the State of Florida received training from many sources, including statewide training agencies, district professional development agencies, and school-based training. Statewide training agencies funded by the

Florida Department of Education included discretionary projects, the purpose of which was to provide professional development to teachers in effective instructional practices. The results reported to the state required participants demonstrate the use of the new skill and to document its result on student learning.

One professional development project identified as Project A was funded by the Florida Department of Education. It provided statewide training from 1998 until 2004 in many effective instructional practices, including algebraic thinking, phonological awareness and the strategic instruction model. The impact that a project like Project A made on teachers in the State of Florida was potentially important to the field of education because it provided professional development in teaching strategies that could help improve student learning to approximately 900 teachers annually. This study analyzes one of the training opportunities offered by Project A in the year 2001. The results of this study provided information on whether or not the investment in discretionary projects, such as Project A, by the State of Florida was an investment that actually helped teachers learn and subsequently implement new skills. Details of Project A are included in Appendix A.

School districts in Florida had the opportunity to send teachers to training offered by Project A. The only cost to the schools was the cost of a substitute teacher for the teacher's classroom during the time of the training. The benefits to the school district that supported teachers who attended these trainings were that teachers received updated training in teaching skills, had the opportunity to

collaborate with fellow teachers in the field, and were able to further their knowledge in their area of certification.

The model of professional development adopted by Project A was based on the fact that the staff developers who functioned as trainers also were required to provide consultation and facilitation in implementing new skills (Sparks & Hirsch, 1997). Project A adapted the related literature (Carnine, 1999; Hargreaves & Fullan, 1996; Joyce, 1990; and Joyce & Showers, 1998; Murphy, 1991) on the vision for staff development into a four-step model for professional development. The first step was the selection of effective instructional practices to train teachers. This new instructional strategy to teach algebraic thinking that was taught at the training in this study was validated by research to be practices that positively impacted student learning. The research on this instructional study is discussed in the related review of literature Chapter 2. This study concerned itself in investigating the next step of the model for professional development.

The second step of the model for professional development was the training in instructional practice. Of special concern in this study was the design of the professional development training offered by Project A to teach new knowledge to teachers. Adult development literature (Brookfield, 1986; Conti, 1978; and Knowles, 1984) suggested that adults engaged more readily in their own learning when they as the learners posed their own problems to solve as opposed to when they were asked to simply sit through a training session to have knowledge imparted to them. Adult teaching theory (Knowles, 1984; Senge, 1990) suggested that one goal for staff development was to help build a

community of learners that promoted learning through the lifetime of an adult. The research conducted in this study analyzed a professional development training session to determine which factors that were generally accepted in teaching adults were perceived by the trainees to be present at a training session offered by Project A. The incorporation of adult learning principles helped determine whether or not the adult learners, in this case study the teachers, became involved in their own learning and, therefore, internalized new skills learned in a training session.

The third step of the model for professional development was the support provided to participants in the implementation of the new skill or strategy. This third step was essential in facilitating the implementation of the new skill in the classroom. In order for training to be successful, support needed to be provided to teachers in their work situations to help develop expertise and answer concerns while the teachers added a new skill to their teaching practices (Sparks & Hirsh, 1997). This support was provided to participants in collaboration with the local school administration, district professional development agencies, and statewide training agencies.

The final step of the model for professional development in Project A was the evaluation of the efficacy of the professional development in providing and helping the teachers effectively implement the new teaching skill. Guskey (2000) described the importance of evaluating professional development to determine if the goals of the training were met. The administrators of Project A had procedures (Appendix B) in place to evaluate the research, selection process,

training, and implementation by participants. After each training session of Project A, they would gather data for evaluation and convene an advisory meeting that determined the future plans for training in the new skill.

The purpose of the training session examined for this study was to improve the teaching of algebraic thinking. The participants were certified teachers in mathematics, elementary education, and special education teachers who collaborated with math teachers from all grade levels. The teachers described in this study were a sample selected from teachers teaching algebraic thinking in Florida. The results of this study may help professional development providers develop training that includes those generally accepted teaching principles.

Statement of the Problem

Professional development for teachers has existed since the early nineteenth century (Guskey 1986, 2000). All through time professional development efforts attempted to help teachers better their teaching techniques to improve student learning. Professional development for teachers has been an avenue to teach adult learners-teachers instructional practices that it was hoped would improve student learning. A small number of research studies and journals (Brookfield, 1986; Conti, 1985a; Conti, 1985b; Guskey 2000; Knowles, 1984) on professional development and adult learning documented a number of ways in which professional development that best facilitated learning for teachers incorporated Knowles' theoretical model of andragogy. Elements of the theoretical model of andragogy incorporated theory and methods to help adults

learn in professional development. Knowles (1984) wrote that both andragogical and pedagogical instructional orientations were supported by the literature. Their appropriate use was based upon the nature of the knowledge to be learned. Most adult education fell in the area of problem-centered knowledge. An andragogical orientation was recommended for this type of knowledge transmittal.

To further address the need for high quality professional development programs for teachers in Florida, in 2001 the Florida Department of Education funded several professional development projects. Project A, which provided professional development in several effective instructional practices, was one of the projects that received funding to provide effective professional development.

Purpose of the Study

The purpose of this study was to evaluate a professional development session offered by Project A and determine how the different factors generally accepted in teaching adults were perceived by the participants and how those factors affected their learning experience, and which factors enabled these participants to implement the new instructional practice.

Project A hired consultants to provide training to teachers. These were trainers who were subject matter specialists. No information was gathered from the trainers about whether or not they were knowledgeable or had received training on how to teach adults, but it was assumed by Project A that adult teaching strategies were incorporated into the training. This study determined participants' perceptions on whether those strategies were used in the training session. Several documents that ascertained satisfaction by participants were

routinely collected by Project A. When analyzed from the standpoint of andragogy theory these documents helped determine the effectiveness of the training from the students' perspective. Of special concern in this study was the design of the professional development training offered by Project A trainers to impart to teachers the skills necessary to teach algebraic thinking to students. The research conducted in this study analyzed this professional development training session to determine if the trainers incorporated principles of adult learning and principles of effective professional development. This study assumed Knowles' theory of andragogy as its theoretical base. Andragogical principles include learner-centered activities, personalizing instructions, relating teaching to student experience, assessing participant needs, climate-building, student participation in the learning process, and flexibility for personal development by students (Brookfield, 1986; Conti, 1982; Cross, 1981; Knowles, 1984).

Significance of the Study

Researchers in the area of professional development (Conti, 1985a; Conti, 1985b; Cross, 1981; Knowles, 1984) have indicated that there was a need to educate trainers in the methods and strategies that incorporated the needs of adult learners so trainers could work effectively with this population. In addition, Cross (1981) supported the use of collaborative learning as an effective strategy for adult learners. Principles of adult learning included learner-centered activities, personalizing instructions, relating to experience, assessing participants needs', climate building, participation in the learning process, and flexibility for personal

development (Brookfield, 1986; Conti, 1978; Cross, 1981; Knowles, 1984) were applied to the analysis to determine if professional development provided to teachers by Project A used a variety of instructional methods that adhered to those accepted principles.

Research Questions

In this dissertation, the following questions were posed:

1. Which factors that were generally accepted in teaching adults were perceived by the trainees to be present in their learning experience at the training offered by Project A?
2. Was there a relationship between the following variables, the years of teaching experience plus the level of education of the participants and the perception by the participants that they had been taught using generally accepted teaching principles that were considered to be most effective in adult teaching?

Definition of Terms

Adult learner refers to a person participating in a training session. In this case the person was a teacher currently teaching in a school and who attended a professional development training to improve his or her teaching.

Algebraic thinking refers to mathematical concepts that help teach algebra curriculum to students.

Andragogy is a term that refers to the “art and science of helping adult [as opposed to child] students learn” (Knowles, 1980).

Collaborative mode of instruction is a process-oriented approach to learning where students learn by working on problem-centered and life situations. The instructor using this mode of instruction would diagnose the learners' level of performance and learning needs and design instruction to meet learner needs.

Learner-centered instruction refers to learners taking ownership of their learning by becoming actively involved in the decision making process of the content and process of the learning experience.

PALS (Principles of Adult Learning Scale) Survey The PALS survey was a document used to determine participants' perceptions of whether professional development trainers were using those generally accepted teaching principles advocated by leading adult educators as being most effective in the teaching of adults. These principles include learner-centered activities, personalizing instructions, relating to experience, assessing participant needs, climate building, participation in the learning process, and flexibility for personal development (Brookfield, 1986; Conti, 1978; Cross, 1981; Knowles, 1984).

Professional development is defined as those processes that improve job-related knowledge, skills, or attitudes of adult learners. Staff development and training will be used interchangeably to mean professional development.

Trainer/Teacher/Facilitator was the person or persons who delivered the professional development opportunity.

Teacher-centered instruction refers to the instructor imparting knowledge to students of content that has been determined prior to students attending training.

Assumptions of the Study

The following were assumptions of the study:

- The trainers of Project A training in a new algebra strategy were knowledgeable in content.

- The trainers of the algebra strategy were knowledgeable in the principles of adult learning.
- The participants in the training reported their perceptions on the PALS survey.

Limitations of the Study

The following limitations were acknowledged in this study:

- The research depended on surveys. The surveys returned may not yield a representative sample.
- The sample surveyed included teachers that taught different content areas, plus some teachers were resource teachers; consequently the background knowledge of the sample varied greatly.
- The sample that responded to the survey was selected with a rubric that determined advanced knowledge of the math content and exceptional education content. This sample was not representative of all teachers and therefore cannot be generalized to all teachers of algebra who teach diverse student populations.
- Data used in this study were from a secondary source. The documents were not produced for research purposes.
- The survey in this study was developed in 1978 and the items surveyed may need to be updated with more current indicators of adult learning principles.

Organization of the Dissertation

Chapter 1 is an introduction, defining the problem and establishing the rationale, purpose, and justification of the study. Chapter 2 is a review of related literature on professional development and adult learning. Chapter 3 discusses the methodology used in this study. Chapter 4 presents an analysis of the data. Chapter 5 presents conclusions and recommendations for further study.

CHAPTER 2

REVIEW OF RELATED LITERATURE

This chapter provides a review of the literature that begins with a historical overview of professional development in the United States, and then examines the purpose, principles, and models of professional development. An overview of the development of adult education in the United States and the basic assumptions of adult learners are also reviewed in this chapter. The chapter concludes with a review of the andragogical model.

Historical Overview of Professional Development

Professional development efforts in American schools have been traced to the initiation of the teacher institutes in the early nineteenth century (Guskey 1986, 2000). The establishment of teacher institutes did not mean that professional development developed smoothly. Most efforts documented in the literature were characterized by acknowledgment of the need for professional development, but noted the ineffectiveness of professional development efforts. Professional development had traditionally been fragmented, non-engaging, and usually unrelated to successful implementation upon completing training. Guskey (1986, 2002) stated that the majority of professional development programs failed because they did not take into account what motivated teachers to engage in professional development or ignored the process by which change in teachers

typically took place. Teachers were most attracted to professional development that helped their students learn (Guskey 1986, 2000).

By the early 1970s, professional development was called in-service and its goal was to bring outside expertise to teachers to increase their knowledge, often with regard to a new program or approach. Prompted by low student achievement, in 1983, the National Commission on Excellence in Education released a report through the U.S. Department of Education entitled *A Nation at Risk*. The report called for a change in the educational system, demanding a higher level of excellence in education. It defined excellence as schools that set high expectations for all learners and implemented ways for all students to achieve these high expectations. The report stated that the solutions to the nation's educational problems needed to include a commitment to life-long learning. One need identified was to retrain teachers to become learning facilitators instead of just lecturers. Professional development became one avenue to retrain teachers. Recommendations of *A Nation at Risk* included improvement in teacher preparation and increased admissions standards for four-year colleges. It demanded action from educators, citizens, and elected officials (Levine, 1994). According to the report, as society changed, the knowledge and skills individuals needed to meet the challenges of life and work also changed, and these changes needed to be reflected in the curriculum taught to students.

To address the need for high quality professional development programs, several studies were conducted in the late 1970s and early 1980s (Fullan, 1985;

Sparks & Loucks-Horsley, 1989). These major studies and reviews contributed to an understanding of the characteristics of effective professional development. One practice that was found in these studies to be important was that effective professional development programs were those conducted in school settings and linked to school-wide efforts (Sparks & Hirsh, 1997; Little, 1997; Sparks & Loucks-Horsley, 1989). Lohman (2000) reported that teaching responsibilities increasingly included playing an active role in the management and operation of schools. These changing role expectations resulted in many new learning needs for teachers.

In the 1980s state legislators and administrators of local school districts recognized professional development as a key aspect of school improvement efforts (Fullan, 1985; Sparks, & Loucks-Horsley, 1989). Professional development linked to school-wide efforts brought about positive change in schools. School improvement efforts that focused on increasing both student achievement and professional development for teachers often resulted in improvements in student learning as well as changing teachers' behaviors in the classroom. Sparks and Hirsh (1997) pointed out that fundamental paradigm shifts had occurred in the nature of professional development and suggested that the emerging professional development be results-driven, standards-based, school-focused, job-embedded, matched to desired instructional practices, focused on content-specific pedagogy, and built on a core set of ideas and beliefs.

Sparks and Loucks-Horsley (1989) stated that effective professional development involved teachers and trained them in peer mentoring and as

planners, along with administrators, of professional development activities. A study of professional development (Sparks & Hirsh, 1997) showed that given the chance, teachers actively chose the goals and activities of their professional development themselves. Also, the professional development activities included ongoing assistance and support upon request by the teachers.

In the 1990s, teachers were required to teach more content and more subjects to classes that contained a greater number of students with emotional, social, and learning disabilities than in the past (Lohman, 2000). Because of the increased demands on teachers, two changes occurred in the field of professional development during that decade. First, the duration and intensity of many training events increased and also started to include various forms of continuing technical support. Professional development was increasingly designed to promote continuous learning in the organization or school setting and to give teachers a range of needed experiences (Loucks-Horsley et al., 1998). Emphasis on self-instruction, with differentiated training opportunities, was one of the aspects of the improved professional development, as was emphasis on demonstration, supervised trials, and feedback-training that was concrete and ongoing over time (Sparks & Loucks-Horsley, 1989). Training sessions that were only offered once were used just to heighten teachers' awareness (Joyce & Showers, 1995).

The National Commission on Teaching and America's Future (1996) reported that, although the quality of teaching significantly affected student learning and educational reform, the teaching profession had suffered from

decades of neglect (Darling-Hammond, 1996). The commission that called for major restructuring of professional development echoed Fullan's (1985) earlier observation that professional development needed to be seen as a promising route to professional growth. Traditionally, teachers were required to take part in professional development programs for certification purposes, but research also showed that teachers participated in professional development because they wanted to become better teachers (Guskey 1986, 2000). Because a better teacher was defined as being able to enhance learning outcomes of students, many teachers availed themselves of professional development opportunities so that they could help improve their performance as teachers.

Purpose of Staff Development

A review of the literature showed two general goals of professional development in education (Joyce & Showers, 1998). The first goal was to enable students to learn the curriculum. The second goal was to increase a student's abilities in the future.

Professional development was defined by Sparks and Loucks-Horsley (1989) as those processes that improved the job-related knowledge, skills, or attitudes of school employees. Some professional development programs that attempted to systematically bring about change have shown results in the form of improved student learning, through three types of change: change in the classroom practices, change in beliefs and attitudes of teachers, and change in the learning outcomes of students (Fullan 1991; Guskey, 1986). According to Guskey (1986, 2002), the order in which the changes occurred was important

because teachers only adopted new practices that showed improvement in student learning. Teachers, who implemented classroom practices they had learned at a professional development opportunity, then subsequently saw a change in student learning outcomes, were the ones who were able to change their beliefs and attitudes about a new classroom practice (Fullan, 1985; Guskey 1986, 2000). Its effects on student learning measured the success of results-driven professional development. As part of any results-driven professional development, teachers learned how to analyze their data based on student performance to show the effects on learning.

Studies showed that effective professional development experiences were designed to help teachers build new understandings of teaching and learning and to persuade them to try teaching strategies that helped students learn in new ways (Bredeson, 2000; Guskey, 1986; Joyce & Showers, 1995). There was an emphasis on the role of inquiry in the form of individuals who studied, taught, and learned, faculties that explored together to improve the learning environment, and districts that learned to bring together their communities of educators and created and implemented positive changes in curriculum, instruction, and technology (Joyce & Showers, 1995). In a review conducted by Paul Bredeson (2000) of the University of Wisconsin-Madison of the 1993-94 "Schools and Staffing Survey" (SASS), a description of teachers' experiences and the impact of various professional development activities on their professional work showed that 97% of all teachers surveyed indicated that, within the past school year, they had participated in such formal professional development activities as school-

district-sponsored workshops and in-service programs, as well as activities sponsored by professional associations, colleges, universities and adult education programs. The 1993-94 SASS (NCES, 1996) provided information on public school teachers' views about professional development opportunities and the impact of those professional learning activities on teachers' beliefs and practices. Teachers were asked about the value of five specific training and development programs in which they had recently participated. Teachers viewed these programs as a very positive investment of their time. Only 10% of the respondents felt that the training was not useful. Most teachers (90%) reported that their participation in these five professional development activities provided them with new information, changed their teaching practices, and caused them to seek additional information. The SASS sample included 13,271 schools and administrators, 68,284 teachers, and 5,429 local education agencies.

There existed differences between in-service training and professional development. According to Killion (2002) in-service training focused on immediate training objectives, while professional development took a broader perspective, the ultimate goal of which was to improve student achievement. Standards-based professional development aligned its content to a research base. Traditionally, states have created standards for student learning. National organizations such as the National Council for Teachers of Mathematics or the National Science Foundation also have created standards for teaching a content area. Job-embedded professional development tied together the practice of the content of the professional development with practice and follow-up in the

classroom and provided feedback in implementation of the new practice.

Professional development that was matched to instructional practices that improved teacher knowledge and/or skill in teaching resulted in improved student learning.

Principles for Professional Development

Related literature (Little, 1993) showed six principles for professional development:

- The first principle offered meaningful intellectual, social, and emotional engagement with colleagues, ideas, and materials, both in and out of teaching.
- The second principle took explicit account of the contexts of teaching and the experience of teachers.
- The third principle offered support for informed dissent.
- The fourth principle placed classroom practice in the larger contexts of school practice and the educational careers of children.
- The fifth principle prepared teachers to employ the techniques and perspectives of inquiry.
- The sixth principle, the governance of professional development, ensured bureaucratic restraint and a balance between the interests of individuals and the interests of the institution.

Professional development was built on a core set of ideas and beliefs that included the school improvement process to promote change in an institution and the principles of adult learning to design the professional development.

Professional development systems for teachers addressed four specific sources of school renewal (Joyce & Showers, 1995): the individual practitioner, the school site, the school district initiative, and the governing agencies. Initiatives for change that have been successful have coordinated all four sources. Training to reach an adequate level of competence in new skills and knowledge required intensive study and many demonstrations, plus opportunities for practice in the training setting. To elevate new learning to the point where it could be operated effectively in the instructional setting, teachers and administrators engaged in extensive practice.

Professional development that was designed with the change process in mind had three distinct characteristics (Fullan, 1991; Loucks-Horsley & Stiegelbauer, 1991). First, the ongoing monitoring of the concerns, questions, and needs of teachers kept teachers and staff informed. Second, teachers and staff paid attention for several years to implementation so that teachers progressed from an early focus on management to a later focus on student learning. This is how teachers created realistic expectations for the system. Third, the professional development was designed to anticipate other demands that distracted teachers from focusing on student learning and built in opportunities for organizational setting of priorities (Joyce & Showers, 1995, Loucks-Horsely, 1995).

Past efforts to implement school reform faced major problems because of inadequate provision for follow-up and implementation of the content of in-school training. Studies of schools that made significant progress showed that when

teachers and administrators worked in a cooperative and collaborative spirit, they successfully carried out major changes (Fullan, 1993). Collaborative work cultures that actively facilitated continuous teacher development demonstrated resilience during school reform efforts (Little, 1997; Fullan & Hargreaves, 1991).

The Concerns-Based Adoption Model

The Concerns-Based Adoption Model (CBAM) (Hord, 1987; Hord, Rutherford, Huling-Austin, & Hall, 1998) addressed change, particularly change in a school setting. It was an empirically based conceptual framework that outlined the development process that adult individuals experienced as they implemented an innovation. This model was developed at the Research and Development Center for Teacher Education at the University of Texas at Austin. It was based on many years of intensive school-based research on the change process as a whole, with special emphasis on implementation of innovations in schools and colleges. This model was based on seven basic assumptions about change and how it was best facilitated (Hord, Rutherford, Huling-Austin, and Hall, 1998).

The first assumption was that change was a process, not an event. It was a process occurring over time, usually over a period of several years. Recognizing that change was not a new program or an event and that it was a very complex process that needed time for it to be implemented was a prerequisite for successful implementation.

The second assumption was that individuals accomplished change. Change affected people, and their role in the process of change was very

important. Only when each teacher in a school had successfully implemented a new practice could there be a conclusion that the school had changed.

The third assumption was that change was a highly personal experience. Each individual reacted differently to change and the importance of these differences was noted. Some teachers assimilated new practices faster than others. Individual attention to each teacher's progress enhanced the overall school improvement process.

The fourth assumption was that change entailed multilevel developmental growth. Teachers demonstrated growth in terms of their acquisition of skills and their positive feelings. These skills and feelings tended to improve with respect to the new practice as the degree of experience with the new practice increased.

The fifth assumption was that change was best understood in operational terms. Teachers related to change in terms of what it meant to them or how it affected their current classroom practice. By addressing such issues as time required implementing the new practice or how much more planning this new practice in concrete, practical terms, it showed teachers the relevance of this new practice and reduced resistance to improvement efforts.

Finally, the sixth assumption was that change facilitation focused on individuals, innovations, and the context. The real focus was on the teachers, not on the new curriculum or the new program. Effective facilitators functioned in a systematic way and recognized that the school improvement process would be affected by whatever was done for the individual teachers.

Professional Development in Mathematics

Some professional development has been specialty-specific. In mathematics, there were several principles that addressed professional development experiences (Loucks-Horsley et al., 1998; NSDC 1994, NCTM, 1989).

- The first principle was that effective professional development experiences were driven by a well-defined image of effective classroom learning and teaching—for example, emphasis on inquiry-based learning, investigations, and problem solving.
- The second principle was that effective professional development experiences provided opportunities for teachers to build their knowledge and skills.
- The third principle was that effective professional development experiences used or modeled strategies that teachers would use with their students.
- The fourth principle was that effective professional development experiences built a learning community.
- The fifth principle was that effective professional development experiences supported teachers when they served in leadership roles—for example, coaching.
- The sixth principle was that effective professional development experiences provided links to other parts of the education system.

The Curriculum and Evaluation Standards for School Mathematics

(National Council of Teachers of Mathematics [NCTM], 1989) identified algebra as a major strand across all grade levels. The standards for algebra identified by the NCTM indicated that instructional programs in algebra from pre-kindergarten through grade 12 had to: 1) enable all students to understand patterns, relations, and functions; 2) represent and analyze mathematical situations and structures using algebraic symbols; 3) use mathematical models to represent and understand quantitative relationships; and 4) analyze change in various contexts.

To represent and solve algebra problems, Project A offered professional development in an instructional strategy entitled STAR (Search, Translate, Answer, Review) and used the Concrete-Semi concrete-Abstract (CSA) continuum. A research study on the STAR instructional strategy focused on problem representation, solution, and general problem solving skills for teaching integer numbers to high school students with learning disabilities (Maccini & Hughes, 2000). Six students with learning disabilities were selected from a secondary public school located in central Pennsylvania. Instruction consisted of the algebra problem-solving strategy STAR within a graduated instructional phase (the CSA). Lessons incorporated computation of integer numbers and problem-solving that involved integer numbers. Students applied the STAR strategy during these instructional phases with the aid of a structured worksheet that incorporated the STAR strategy steps. In the first phase, the concrete application, students were taught to represent math problems via manipulatives. In the second phase of instruction, the semiconcrete application, students moved to a two-dimensional representation of math problems. As in the concrete application, a structured worksheet was provided to cue students to use the first two steps of STAR. Instead of using manipulatives, students represented the problems with drawings of the algebra tiles. Then, in the third phase of instruction, the abstract application, students represented and solved math problems using numerical symbols, answered the problem using a rule, and reviewed the solution and checked the reasonableness of their answers.

Participants in this study improved on their accuracy of problem representation

and problem-solving. Categories of marked improvements included (a) searching the word problem, (b) translating the word problem into an equation, (c) identifying the correct operation or operations, (d) drawing a picture of the problem, (e) writing a correct equation, and (f) answering the problem.

Miller and Mercer (1993) conducted extensive research on the graduated instructional phase CSA when teaching math strategies. In a study conducted on 9 students with learning difficulties in math at the elementary level, teachers used lessons that incorporated CSA strategies over a period of one month. The results showed that students instructed using CSA strategies acquired the math skills taught during that period of time. The conclusion was that CSA method seemed to be a viable math intervention tool for students with learning difficulties in math. Project A contracted trainers who would train teachers in the STAR strategy using the graduated instructional phase CSA as part of the training.

Principles Common to Most Programs for Professional Development

Among the many models, several principles were repeatedly cited as necessary components of professional development: needs assessment, adult learning, program development, and public speaking. Universal principles of andragogy also appeared in the literature on planning and delivering professional development to teachers. One of the guiding principles of adult learning in professional development was to enable people to learn new knowledge and skills, and then transfer that knowledge and skills to active classroom practice (Friend & Cook, 2000; Joyce & Showers, 1998). Learning situations integrated new ideas with existing knowledge. Professional development activities that

included andragogical principles helped adult learners to see how the new information was relevant to them and planned ways to share their experience with each other.

Another guiding principle of adult learning in professional development was that of assessing the needs of individuals and groups (Friend & Cook, 2000; Joyce & Showers, 1998). The professional development activities that incorporated andragogical principles planned to build success incrementally and to help learners become more effective and competent. According to experts in the field of adult education, adult education was an investment of the "self" in learning and it impacted the learner's self-concept or self-esteem (Tennant & Pogson, 1995).

Tennant & Pogson (1995) described an additional guiding principle of adult learning in professional development opportunities, that the learning activities involved learners in situations that were practical and problem centered. The development of adult learning capacity addressed the way adults learned. Research suggested that problem solving and the context in which the learning was set became increasingly important with the age of the adult learner.

Models of Professional Development in Teacher Education

In general, professional development over time has attempted to help school organizations design the systems and structures they needed to support continuous learning (Sparks, 1994). At present, districts and schools offered many ways for teachers to receive professional development based on widely accepted models for professional development. Five commonly used models for

professional development will be examined in detail in this chapter. They are individually guided professional development, observation and assessment, involvement in a development/improvement process, training, and action research (Guskey 1986, 2000; Sparks & Loucks-Horsley, 1989).

In this review, five models of professional development will be discussed. These models are individually guided development, observation/assessment, involvement in an improvement process, training, and action research (Sparks & Loucks-Horsley, 1989; Guskey 2000). These models presented teachers a variety of options to enhance professional knowledge and teaching skills. Professional development providers have used these models for years in one form or another.

The Individually Guided Professional Development Model

This was a process by which teachers planned for and pursued activities they believed promoted their own learning. The key characteristic of the Individually Guided Professional Development Model was that the learning was designed by the teacher and it included reading professional publications, discussing and communicating with colleagues, experimenting with new instructional strategies, or a combination (Sparks & Loucks-Horsley, 1989). This model assumed that individuals best judged their own learning needs and that they were capable of self-direction and self-initiated learning (Knowles, 1980). Individually guided professional development allowed teachers to find answers to self-selected professional problems using their preferred modes of learning. The essence of professional development for teachers was inquiry: individuals

studied, taught, and learned, faculties explored together to make the learning environment better, and districts learned to build the larger communities of educators that created and implemented changes in curriculum, instruction, and technology (Joyce & Showers, 1998).

The first step of individually guided staff development was for the teacher to identify a need or interest. Next, the teacher developed a plan that met the need or interest. This planning ranged from very informal planning to formal documentation of the plan. Next, the teacher engaged in learning activities to help him/her achieve the plan. Finally, the teacher evaluated whether or not the learning needs were met (Sparks & Loucks-Horsley, 1989).

The Observation and Assessment Professional Development Model

This model provided teachers with objective data and feedback regarding their classroom performance. Observation and assessment of instruction provided the teacher with data that could be reflected upon and analyzed for the purpose of improving student learning. This process produced growth or, in some instances, selected areas of growth. In many school districts, a supervisor observed teachers and the observation was used for an evaluation of the teacher. This model of professional development also took the form of peer coaching and clinical supervision (Sparks & Loucks-Horsley, 1989). The observation model usually included a pre-observation conference, actual observation, analysis of data from the observation, and a post-observation conference (Loucks-Horsley et al., 1987). In peer observations, teachers visited one another's classrooms, gathered data about student performance or teacher

behavior, and gave feedback in a follow-up conference (Joyce & Shower, 1982). This model allowed teachers to better understand what was required to improve their performance. Change in attitudes and ideas or actions and behavior of a teacher occurred as a mutually interactive professional development process. Attitudes were restructured both through new understandings and experimentation with new behaviors and by their results on student learning. (Guskey, 1986; Loucks-Horsley et al., 1998)

The Model of Involvement in a Development/Improvement Process

This model engaged teachers in developing curriculum, designing programs, or engaging in a school improvement process to solve general or particular problems. One assumption of this model was that adults learned most effectively when they had a need to know or a problem to solve (Knowles, 1980). Serving on a school improvement committee required teachers to read the research on effective teaching and also learned new group and interpersonal skills. Curriculum development demanded new content knowledge of teachers. In each instance, teachers' learning was driven by the demands of problem-solving (Sparks & Loucks-Horsley, 1989). Curriculum planning was conducted in heterogeneous groups composed of teachers with low, medium, and high abstract reasoning abilities. The complexity of curriculum development was matched to the abstract reasoning ability of the majority of teachers in the group (Glickman, 1986).

This model began with the identification of a problem or need by an individual, a group of teachers, a school faculty, or a district administrator. The

need was identified through informal discussion or a growing sense of dissatisfaction or through a formal process, such as brainstorming or surveys. After the need was identified, a response was formulated. Many variables needed to be identified and the staff development entity helped to formulate the response and developed a plan to implement the solution. Next, the plan was implemented or the product was developed. The final step was to evaluate the success of the program.

The Training Model

This model was characterized by attending sessions in which the presenter was the expert who established the content and flow of the sessions. Examples of training included workshops, institutes, seminars, and courses. Typically the training session was conducted with a clear set of objectives or anticipated learner outcomes. These outcomes frequently included awareness or knowledge, skill development, and presentation of the technique for teachers to replicate in their classroom (Sparks & Loucks-Horsley, 1989). Joyce and Showers (1988) noted that training should have included exploration of theory, demonstration or modeling of a skill, practice of the skill under simulated conditions, feedback about performance, and coaching in the workplace. Exploration of theory through discussion, readings, lectures, and the like was necessary for an understanding of the rationale behind a skill or strategy and the principles that governed its use. Demonstration or modeling of the skill might have been done either in simulated settings through film or videotape, or live in the training setting. Demonstrating competency in the skill under simulated

conditions provided practice and a safe environment for exploration. Participants must have had sufficient opportunity to develop a skill so they could eventually practice it in classroom settings. The coaching step was necessary to develop skills in teachers. Discussion and peer observation were useful for evaluating the progress after teachers had an opportunity to try out new strategies in their classrooms (Sparks, 1983). In peer coaching, educators worked collaboratively to solve problems and answered questions that arose during implementation.

Training and peer coaching were two components of professional development that complement each other (Joyce & Showers, 1998). A measure of full implementation of a new program was the full assimilation of the program in the teacher's lesson plans. Coaching was an effective way to provide teachers with technical feedback, guided them in adapting the new practices to the needs of their students, and helped them to analyze the effects on students (Joyce & Showers, 1982). Administrators, curriculum supervisors, college professors, or fellow teachers were resources who could provide further assistance.

As of 2004, teachers in Florida received training from many agencies, such as statewide training agencies, district professional development agencies, and school-based training. Statewide training funded by the Florida Department of Education included discretionary projects the purpose of which was to provide professional development in effective instructional practices to teachers. These projects were accountable to the state and were required to demonstrate participants' use of the new skill learned and its result on student learning.

One professional development project identified as Project A, funded by the Florida Department of Education, provided training in many effective instructional practices statewide from 1998 until 2004. The impact that a project like Project A made on teachers in Florida was important to the field of education because it provided professional development to approximately 350 teachers in teaching strategies that helped improve student learning. This study analyzed one of the training offered by Project A in the year 2001. The results of the study provided information on whether the investment in discretionary projects, such as Project A, by the State of Florida was an investment that helped teachers learn and implement new skills. Details of the project are included in Appendix A.

The Action Research Professional Development Model

This model, sometimes called the inquiry model (Sparks & Loucks-Horsley, 1989), required teachers to identify an area of instructional interest, to collect data, and to make changes in their instruction based on an interpretation of those data. Action research in education was considered an ongoing process of systematic study in which teachers examined their own teaching and students' learning through descriptive reporting, purposeful conversation, collegial sharing, and critical reflection for the purpose of improving classroom practice (Little & Rawlinson, 2002; Miller & Pine, 1990; Sagor 2000). Educators involved in action research became better problem solvers. Teachers became more effective decision-makers and gained more confidence in what they believed about curriculum and instruction. Action research has also been an activity that helped support school reform. Through action research, teachers defined the research

questions and, therefore, had ownership of the process of change. Action research allowed teachers to examine their teaching practices in a systematic, ongoing way with the purpose of changing their teaching practices (Loucks-Horsley et al., 1998; Sagor, 2000).

Elements that were found in action research included identifying a problem, gathering related information, developing an action plan, implementing the plan, and evaluating results. Definition of a specific problem was fundamental to action research. During this step, teachers objectively investigated the factors related to the suspected problems and established goals for improvement within the classroom. Usually an action plan was developed, implemented, and monitored to address a problem through classroom-based research. Resources, staff development, and continuous support through the implementation process were specifically targeted toward the accomplishment of the action research. Ultimately, classroom action research was a reflective process of change. Reflective practitioners and teachers as researchers reflected on the work and engaged in innovative practices (Calhoun, 1994; Joyce & Showers, 1998; McKay, 1992).

Levels of professional development evaluation

Effective professional development evaluations required the collection and analysis of five critical levels of information (Guskey 2000). Those five levels are discussed below.

Level 1. The participants' reactions. This first level of evaluation analyzed participants' reactions to the professional development experience. Information

was generally gathered through questionnaires given at the end of the training session. This level of evaluation measured initial satisfaction with the professional development experience. The information gathered was used to improve program design and delivery of professional development (Guskey 2000).

Level 2. The participants' learning. This second level of evaluation focused on measuring the knowledge and skills that participants gained. Usually these goals were outlined at the beginning of the training. Measures showed attainment of specific learning goals. The information was usually gathered through demonstrations, simulations, participant reflections, participant portfolios, and case study analyses. The information gathered was used to improve the professional development content, format, and organization (Guskey 2000)

Level 3. Organization support and change. This third level focused on the organization and its support of the professional development opportunity. At this level, the evaluation determined if the professional development opportunity promoted changes compatible with the mission of the school or district. Were the changes at the individual level encouraged and supported at all levels? At this level, evaluation data was gathered from school records, minutes from follow-up meetings, questionnaires, and interviews with participants and school administrators. The information gathered at this level was used to document and improve organizational support and to inform future change efforts (Guskey 2000).

Level 4. The participants' use of new knowledge and skills. This fourth level gathered data on indicators of both degree and quality of the implementation of the new knowledge and skills. Sufficient time would have passed to allow participants to adapt the new ideas and practices to their own setting. It was necessary to measure progress at several intervals. Data were gathered through questionnaires, interview with participants, personal reflections, portfolios, and direct observations (Guskey 2002).

Level 5. Student learning outcomes. This fifth level measured the effect of the professional development opportunity on student learning. Measures of student learning included portfolios, grades, and scores on standardized tests. Other measures were survey of self-concept, study habits, attendance, behavior, and so on. The information gathered was used to demonstrate the overall impact of professional development (Guskey 2002).

Historical Overview of Adult Education

The adult education movement grew rapidly after World War I. In America, Frederick Keppel, president of the Carnegie Foundation, which convened the first American Conference on Adult Education in 1924, led the movement. The result of this conference was the initiation of a series of studies on adult education. It first focused on vocational endeavors. In the 1920s, experts saw three functions of adult education. The first function was to diffuse knowledge and culture. The second function was liberal education. The final function was social education.

The growing acceptance of life-long learning was hastened by the increase in specialization after World War II and the recognition that adults

learned differently from children (Knowles, 1984). In 1946, the first national conference on adult education was held in Detroit. Conference participants identified several national policy issues related to postwar readjustment, including educational tasks related to returning veterans, conversion to a peacetime economy, social technological changes, and the international situation (Stubblefield & Keane, 1994). After the conference, the Joint Commission for the Study of Adult Education was formed. It consisted of members from the American Association of Adult Education (AAAE), the Department of Adult Education of the National Education Association, the Adult Education Board of the American Library Association, the Educational Film Library Association, and the National University Extension Association (Knowles, 1980). This commission studied such problems of American life as developing competent citizens, creating awareness of the need for continued learning, clarifying the relation between general adult education and vocational education, and addressing the special needs of the illiterate, handicapped, and foreign-born (Stubblefield & Keane, 1994). The commission recommended that a national organization on adult education be developed. In 1951, the Adult Education Association (AEA) was founded. In 1954, Malcolm Knowles, then executive director of AEA, framed the idea of an adult education movement in practical terms and articulated achievable goals. Some of these goals included engaging workers in adult education in a common fellowship and securing acceptance of adult education as the fourth level of education so as to produce as much knowledge about adult

learning and behavior as already existed about children (Stubblefield & Keane, 1994).

In the 1960s, the federal government used adult education in the service of distributive social justice to address the crisis in race and class through the War on Poverty. In the 1970s, the education and philanthropic communities sought to gain recognition of life-long learning as a master concept for planning and organizing services in support of adult learning. A transition to the postindustrial society made continued learning an imperative and opened new discussions on applying the concept of adult education to more domains of adult learning. In the 1980s, the crisis of many in the workplace unprepared to deal with the demands of new technology became the catalyst for education action for adults (Stubblefield & Keane, 1994).

Research studies (Hendrick, 2001; Lohman, 2000; Wegge, 1991) have shown that adults became increasingly self-directed and that their readiness to learn was stimulated by real-life tasks and problems. Adults preferred learning situations that involved the following five basic assumptions of adult learning (Knowles, 1980) discussed below.

Basic Assumptions of Adult Learning

The first assumption was that adults had a need to know, whether it was building on something already known or exploring new areas, adults wanted to learn things that seemed relevant and applicable to their current lives, including work and family matters (Taylor, Marienau, & Fiddler, 2000). Professional development activities that addressed this assumption provided overviews,

summaries, and examples and then involved adults in collaborative, problem-solving activities. These professional development opportunities involved learners in situations that were practical and problem-centered. The development of adult learning capacity dealt with the way adults learned. Research suggested that problem solving and the context in which the learning was set became increasingly important with the increasing age of the adult learner (Hendricks, 2001; Tennant & Pogson, 1995). The reason for this was that, with time, adults experienced real-life problems that were open-ended and required adults to make decisions that changed the course of their lives. Teaching adults in context accessed their prior knowledge and experiences to expand or build on them. A study of twenty-two experienced teachers was conducted to determine what aspects of their work environment inhibited them from engaging in informal learning (Lohman, 2000). One of the four environmental inhibitors identified the limited decision-making power of school management. Teachers in this study expressed their belief that real-life problems and decisions that changed the work environment would motivate them to participate in professional development. The other three factors identified in this study were lack of time for learning, lack of proximity to learning resources, and lack of meaningful rewards for learning.

The second assumption related to adult learning was that adult education had a positive effect on the learner's self-concept. Adults preferred learning situations that promoted their positive self-esteem. These professional development activities included a plan to build success incrementally to help learners become more effective and competent. Experts in this field asserted that

adult education was an investment by the "self" in learning. This investment in learning impacted the learners' self-concept or self-esteem (Tennant & Pogson, 1995). Teachers as adult learners improved their concept of themselves, as teachers, by validating their current practices and learning new concepts that helped them become better teachers. As teachers practiced their new knowledge, they added to their prior knowledge and experience and felt that their students were learning.

A study of a sample population of two hundred fifty educators in the Portland, Oregon, metropolitan area was conducted by Livneh & Livneh (1999) to identify those skills, values, and characteristics that predicted the likelihood of involvement in professional development by educators. The Characteristics of Lifelong Learning (CLLP) survey instrument was used to determine the characteristics of life-long learners among professionals. The results of the study indicated that self-motivated learning was the variable with greatest significance among educators. Participants who were self-motivated rather than motivated by others were able to evaluate their own learning and engage in self-initiated study.

The third assumption addressed the role of the learner's experience. Adult learners brought personal experiences, work experiences, and social experiences to the learning environment. These experiences made valuable contributions to the learning process (Little, 1993; Taylor, Marienau, & Fiddler, 2000). Appropriate professional development activities assessed participant knowledge before an event. The learning episodes then capitalized on the learner's prior experience. These activities also helped learners see how the new

information was relevant to them and planned ways to share their experiences with each other (Conti, 1985a; Conti, 1985b; Knowles, 1984).

The fourth assumption was that learners were ready to learn. Good learning experiences showed respect for the individual learner. Community colleges addressed a shift in paradigm from a "teaching college" to a "learning college" for adult learners. In line with this philosophy, community colleges across the nation attempted to become more learner-centered, that required learners to become more active and involved in their own learning and teachers to serve as facilitators of learning (Barr & Tagg, 1995). In a study conducted by Ruehl (2000), community college instructors were surveyed to determine their awareness and application of adult learning styles. This study used the PALS scale to survey full-time and part-time instructors at a community college to determine their awareness of adult learning needs and their application of this knowledge in the classroom. The results of the study failed to show a significant difference between full-time and part-time faculty except in the area of "Personalizing Instruction," where full-time instructors scored higher than part-time instructors. The results imply that instructors of adults impacted the learning experience and by respecting student needs created a learning environment where they took leadership in their own learning.

The fifth assumption was that the learner was motivated. Learning situations allowed for choice and self-direction. Self-direction in learning improved the learner's willingness and capacity to manage learning in an environment the learner could control. Motivation and self-direction fostered

learner autonomy where the learner could reflect, analyze evidence, and make judgments. Knowles (1984) suggested that teachers of adults use techniques that build upon adults' natural capacity and desire to plan and conduct their own learning. Therefore, the role of the professional developer became that of a facilitator of learning, that is, one who assisted learners to formulate goals and objectives, located appropriate resources, planned learning strategies, and evaluated the outcomes of learning (Conti, 1985a; Conti, 1985b; Knowles, 1984).

In many cases, educators of adults formulated the needed learner outcomes and students learned in these situations as well. Waters (1992) in a study to determine whether or not community college faculty were using generally accepted principles in teaching adults had faculty respond to the PALS subscale to determine their self-perceived teaching style. One hundred and one faculty members participated in this study. The results demonstrated that regardless of the teaching content, age, race, and gender respondents scored below the PALS scale mean. The results suggested that faculty in these community colleges employed teaching strategies that tended to be teacher-centered and not learner-centered. This study suggested that instructors that teach in a less collaborative style might do so in response to the students' learning styles and preferences for teacher-centered learning.

Based on the adult learning principles stated above, teaching concepts derived from adult learning theories were based on the teacher or professional developer being a facilitator of learning for adults (Knowles, 1984). In a study by Wegge (1991), in-service interventions were presented to two experimental

groups with knowledge of andragogical methods of instruction. A control group received no in-service training. The educational orientation of each instructor was assessed by himself or herself and by their adult students. The assessment was based on the Principles of Adult Learning Scale (PALS). PALS measured the extent to which instructors practiced the collaborative mode of teaching that was widely supported in the adult education literature (see Chapter 3 for more detailed description). A form of PALS adapted for adult student use was administered to all individuals in the two experimental groups and in the control group.

Wegge (1991) showed that, if professional development were provided to trainers and instructors on andragogical methods of instruction, then these would be utilized when they taught adults. Wegge's study on the effect of professional development training on part-time adult continuing-education instructors concluded that instructors who attended in-service training that not only presented the andragogical methods of instruction, but also utilized these practices in the in-service activity itself, demonstrated an educational orientation more closely aligned with those principles of andragogy than those instructors who did not participate in the in-service activity.

Principles of Teaching Adults

Most adult education fell into the realm of problem-oriented learning for which an andragogical instructional orientation was appropriate (Knowles, 1984). The following were the most commonly accepted principles of teaching adults (Knowles, 1984). These four principles were based on the assumption that

learners felt a need to learn. First, the teacher exposed students to new possibilities of self-fulfillment. Second, the teacher helped students clarify their own aspirations for improvement or acquisition of new knowledge. Third, the teacher helped each student diagnose the gap between present level of performance and aspirations. Fourth, the teacher helped the students identify the life problems they experience because of those gaps in their personal experience.

The Andragogical Model

The andragogical model was a process model concerned with the procedures and resources needed to help learners acquire information and skills (Knowles, 1984). The andragogical teacher or facilitator prepared in advance a set of procedures for involving the learners in a process that included the following elements. First, the teacher established a climate conducive to learning. The physical environment where the learning occurs needed to be at a comfortable temperature and have comfortable chairs, adequate lighting, good acoustics, and easy access to refreshments and restrooms. The size and layout of the training room should have been large enough (or small enough) to accommodate the learning activities. Many appropriate resources such as videos, computers, books, and experts, should have been readily available to the learners. The resources should have been varied so that the learners could use them proactively. The human and interpersonal climate conducive to learning was also an important aspect of establishing a climate conducive to learning. The human and interpersonal climate included an environment that rewarded self-

improvement and increased motivation in the learner. It also should have been an environment that stressed the importance of questioning and honest and objective feedback and one where individual and cultural differences were respected (Guskey 2000; Knowles, 1984).

Second, the andragogical teacher created a mechanism for mutual planning. Traditionally the planning for a staff development opportunity had been the responsibility of the teacher or facilitator, but this practice was in conflict with an adult's need to be self-directing, one of the adult learning principles (Guskey 2000; Knowles, 1984). Learners tended to feel committed to a decision or activity in direct proportion to their participation in or influence on its planning and decision-making (Conti, 1985a; Conti, 1985b; Knowles, 1984). Therefore, staff development programs should have had planning committees for organized staff development programs (Knowles, 1980). Mechanisms for mutual planning should have been respected and acted upon to gain the trust of the learners. According to a study conducted by Hendrick (2001), consensual planning that included reasoning and consulting with the adult learners was deemed effective by participants of the study. Participants were students and faculty members from multiple adult-education graduate programs in North America. The results indicated that professional development planners benefited from a greater understanding of the power of including participants in the planning process.

Third, the andragogical teacher diagnosed the needs of those who wished to be taught. There were two aspects in this process (Knowles, 1984). The first aspect was to construct a model of desired competencies that was, the requisite

abilities or qualities. In constructing a model of desired competencies to determine learning needs, two sources of data should have been analyzed. The first source was the individual. The individual learner's own perception of what he or she wanted to achieve was a starting point for building a model of competencies. The learner then understood how the acquisition of certain knowledge or skill's added to his or her ability to perform better. Learners then entered into the learning situation with a clearer sense of purpose and saw what they learned as being more personal.

The second aspect was assessing discrepancies, that were, determining the gap between the competencies specified in the model and the present level of development in the learner. According to andragagogical theory, the assessment was a self-assessment, with the facilitator providing the learners with tools and procedures for learners to make responsible judgments about their level of proficiency in the competencies. This was the learners' own perception of the discrepancy between where they were and where they wanted to be or needed to be (Conti, 1985a; Conti, 1985b; Knowles, 1984).

Fourth, the andragagogical teacher formulated program objectives or content that satisfied the needs of the learners. The learner was likely to resist unless he or she freely chose the learning objectives and perceived them to be relevant to his or her self-diagnosed needs (Conti, 1985a; Conti, 1985b; Knowles, 1984). The design pattern for learning experiences needed to include ways to determine learner needs prior to developing the learning objectives. The content to be taught then had to be relevant to the learners needs. Barr and Tagg (1995)

stressed that there had been a paradigm shift in education. If colleges and education entities existed to produce learning, learning needed to be individualized to meet the needs of each adult learner. This new learning paradigm proposed that entities that taught adults focus their efforts to create learning environments where students could discover knowledge and promote their own successes. By allowing the learners to choose their learning objectives, the andragogical teacher practiced strategies based on sound andragogical practice that promoted learning in their adult students.

Fifth, the andragogical teacher designed a pattern of learning experiences. In andragogy, the design model involved concentrating on problem areas that had been identified by the learners through self-diagnostic procedures, then selected appropriate formats (individual, group, and mass activities) for learning. The design pattern of learning experiences included units of experiential learning utilizing appropriate methods and materials and arranging them in sequence according to the learners' readiness and aesthetic principles. Knowles (1984) built into the designs of programs activities he termed "learning how to learn" activities that made clear the difference between proactive and reactive learning. This brief activity utilized the concept of self-directed learning to help adults feel more secure in the adult educational programs (Conti, 1985a; Conti, 1985b; Knowles, 1984).

Sixth, the andragogical teacher conducted these learning experiences using suitable techniques and materials. This element concentrated on the facilitator or professional developer and how they taught an adult using adult

learning principles instead of the traditional pedagogical techniques (Conti, 1985a; Conti, 1985b; Knowles, 1984). Graham (1988) conducted a study to examine the relationship between the characteristics of the instructor and the rate of adult retention in two northern Illinois community colleges. The results indicated that teachers who employed teacher control of the learning environment retained significantly more adult students in the first half of the course as those who practiced andragogical techniques, but teachers who employed a strategy of more learner control retained more adult students in the last half of the course. This study described how the teachers could improve retention of adult students in classes by modifying their teaching behaviors to more andragogical style by addressing the learner needs as the class proceeded.

Seventh, the andragogical teacher evaluated the learning outcomes and re-diagnosed learning needs. Every evaluation process should have included some provision for helping learners re-examine their models of desired competencies and reassess the discrepancies, if any, between the model and their newly developed levels of competencies. Thus, repetition of the diagnostic phase became an integral part of the evaluation process and, consequently, furthered learning. Evaluation should have been both quantitative and qualitative in order to get the whole picture of the effects of a program (Conti, 1985a; Conti, 1985b; Knowles, 1984).

A study conducted by Conti & Welborn (1986) on instructors of health professionals identified two approaches to teaching those who favored a teacher-

centered approach and those who favored a learner-centered approach. Those who preferred a teacher-centered approach functioned as managers of the classroom conditions, an approach they had deemed as necessary to bring about the desired behavioral change in the student. Those who favored the learner-centered approach supported such activities as encouraging students to take responsibility for their own learning, personalizing instruction, relating new learning to prior experiences, assessing student needs, involving students in the learning process, and fostering flexibility in the classroom to stimulate students' personal development. The study concluded that academically the greatest student success was achieved in a learning environment where students were treated as adults during the learning process, that is, the second method, which employed andragogical techniques.

Summary

Chapter 2 presented a review of literature. It began with a historical overview of professional development in the United States, then examined the purpose, principles, and models of professional development. A historical overview of the development of adult education in the United States and basic assumptions of adult learners were also reviewed in this chapter. The chapter concluded with a review of the andragogical model.

Chapter 3 describes the research questions and the research design of the case study. Chapter 4 explains the results of the study and Chapter 5 presents conclusions and recommendations for further study.

CHAPTER 3 RESEARCH METHODOLOGY

Introduction

The study of a typical professional development session by Project A provided the opportunity to evaluate professional development and determine how the different factors generally accepted in teaching adults were perceived by the participants and how those factors affected their learning experience. These accepted principles of adult learning included learner-centered activities, personalizing instructions, relating teaching to student experience, assessing participant needs, climate-building, student participation in the learning process, and flexibility for personal development by students (Conti, 1978; Cross, 1981; Knowles, 1984, Brookfield, 1986). Additionally, the study analyzed whether the participants' level of education and years of teaching experience influenced their perceptions of certain principles listed above. This chapter is organized into the following sections: research questions, documents, qualitative research, research design, methods and procedures, data analysis, validity and reliability, investigator bias, and ethical issues.

Research Questions

A case study approach with descriptive methods of data collection was employed. This study took Knowles' (1984) theory of andragogy as its theoretical base. The theoretical model of andragogy incorporated elements of the theory of

teaching adults and methods to help adults learn, here in professional development. Grounded in this theory, the following questions guided the research in the study:

1. Which factors that were generally accepted in teaching adults were perceived by the trainees to be present in their learning experience at a training offered by Project A?
2. Was there a relationship between the following variables, the years of teaching experience plus the level of education of the participants, and the perception by the participants that they had been taught using generally accepted teaching principles that were considered to be most effective in adult teaching?

To address the research questions and determine whether generally accepted practices used in teaching adults were perceived by the trainees to be present in their learning experience at a training offered by Project A, the following documents were reviewed by the researcher.

Documents

Documents and written records reviewed included a Principles of Adult Learning Scale (PALS) survey completed by participants prior to the beginning of the training and then again upon completion of the training sessions. The PALS provided the participants' perceptions of the use of factors generally accepted in teaching adults. A second source of written records included participants' written evaluations of the training sessions. The final source of written records reviewed was copies of action plans developed by the participants on how they planned to implement their newly acquired skills in their classrooms.

PALS survey

One instrument used in collecting data for this study was a survey adapted from the PALS developed by Conti (1978, 1985a, 1985b, 1986, 1989, 1990). Conti (1978) designed it to determine whether or not training addressed the accepted principles of adult learning in any given practice setting. Based upon principles of effective methods for teaching adult learners proposed by leading scholars in the field, Conti (1978, 1985, 1986) developed and refined the PALS to measure the extent to which practitioners supported the collaborative mode of teaching and learning. The collaborative mode of teaching and learning for adults was based on a curriculum that was learner-centered. The collaborative mode of teaching and learning capitalized on the learner's experience and assumed that adults were self-directed. It also assumed that the learner participated in needs diagnosis, goal formation, and outcome evaluation of their learning experience. The collaborative mode of teaching and learning assumed that adults were problem-centered, and that the teacher should serve as a facilitator rather than a repository of facts (Conti 1985a).

The PALS survey was a 44-item summated rating scale with a six-point modified Likert scale that asked participants to report on the frequency with which they practiced or experienced a variety of activities related to teaching adults. It yielded a score that indicated the degree to which teachers or facilitators supported the collaborative mode as described in the adult education literature (for a review, see Conti, 1985b). The PALS survey provided an overall score and seven individual subscale scores. These subscales indicated the

degree to which the instructor(s)/trainer(s) supported the elements that composed the collaborative mode of instruction. These subscales are described below.

Subscale 1. Learner-Centered Activities. This rated whether or not the instructor practiced behaviors that encouraged students/participants to take responsibility for their own learning and if the instructor established a classroom/training where the activities were learner-centered.

Subscale 2. Personalizing Instructions. This identified instructors/trainers who used a variety of methods to meet the unique needs of each individual student/participant.

Subscale 3. Relating to Experience. This determined whether or not the learning activities were organized based on the prior experiences of the student/participant and if they related these experiences to new learning.

Subscale 4. Assessing Student Needs. This provided information about the instructors'/trainers' ability to a) find out what a student/participant wanted and needed to know b) diagnosed gaps in performance level, and c) set goals and determined objectives to meet these goals.

Subscale 5. Climate Building. This determined whether or not the instructor/trainer built an environment that facilitated learners' exploration, built self-concept, and developed problem-solving abilities and social skills without fear of failure.

Subscale 6. Participation in the Learning Process. This indicated the degree to which the instructor/trainer encouraged students/participants to

become involved in determining the content and criteria for evaluation of performance.

Subscale 7. Flexibility for Personal Development. This indicated whether or not the student felt that the instructor believed and demonstrated that personal fulfillment was a central aim of education. Instructors/trainers who scored high in this area were able to adjust the content and environment of the classroom/training to meet the changing needs of students/participants.

Participants' Written Evaluation of the Training Sessions

Participants completed an evaluation form provided by Project A, a pseudonym for a professional development project. This form solicited participants' comments on the overall training sessions to determine whether the training objectives were met and to determine the quality of the training sessions. Project A developed this form by adapting the questions used by the National Staff Development Council (NSDC) Standards for Staff Development and Guskey's (2002) theory on evaluating professional development. The NSDC Standards for Staff Development provided direction to staff development agencies to develop high-quality professional development. The standards were developed in collaboration with 25 educators and policy-makers from more than 15 professional education organizations. The standards reflected prerequisites of context, process, and content for staff development to facilitate higher levels of learning (see References for NSDC Standards web address). The process standards were used by Project A to develop a tool to evaluate the training experience. Some of the descriptors in the process standards included using

learning strategies appropriate to the intended goal, application of knowledge about human learning and change, and using multiple sources of information to guide improvement and demonstrate its impact.

According to Guskey (2002), questions used to determine participants' reactions to a professional development experience focused on whether or not they liked the experience. These questions should have aligned with content questions, process questions, and context questions. Content questions addressed the relevance, utility, and timeliness of the topics explored through the professional development experience (Guskey 2000). An example of a content question used by Project A was, "What was the most important, relevant information to you?" Process questions related to the conduct and organization of the professional development (Guskey 2000). More specifically, these questions asked about specific activities in which participants engaged. Examples of process questions used by Project A were, "What was the overall quality of presentations?" and "Did you have opportunities for practice the new instructional skill?" Context questions related to the setting of the professional development experience (Guskey 2000). These questions provided information on the environment at the professional development, such as appropriate room size, room temperature, lighting, and refreshments.

Plans to Implement New Instructional Strategy

Implementation action plans were developed by the participants to implement upon return to their classroom the instructional strategy which was entitled STAR-Search, Translate, Answer, Review-researched by Maccini and

Hughes (2000) and used the Concrete-Semi concrete-Abstract-CSA- continuum to represent and solve algebra problems which are referred in this study as the "new instructional strategy" (Miller & Mercer, 1993). According to Guskey (2002), professional development was a process that should have been designed to enhance professional knowledge and skills of educators. In the evaluation of professional development it was important to assess participants' learning (Guskey 2000). Collection of data on participants' learning provided a tool for Project A to determine if participants understood the new instructional strategy well enough to implement it upon return to their classroom, so Project A asked participants to develop a plan to implement the new instructional strategy. This researcher completed the analysis of the plans created by each participant. The implementation plans were analyzed to determine participants' intent to apply the new instructional strategy. The researcher also identified the planned steps and timelines of implementation given by each participant.

Qualitative Research

As of 2004, teachers in Florida had received training from many different sources, such as statewide training agencies, district professional development agencies, and school-based training. Statewide training agencies funded by the Florida Department of Education included discretionary projects the purpose of which was to provide professional development to teachers in effective instructional practices. These projects were accountable to the state and were required to demonstrate that participants benefited from attending project-sponsored training. In this study, Project A provided training to teachers in an

instructional strategy entitled STAR (Search, Translate, Answer, Review) and used the Concrete-Semi-Concrete-Abstract (CSA) continuum to represent and solve algebra problems, referred to in this study as the new instructional strategy (Maccini & Hughes, 2000; Miller & Mercer, 1993). The purpose of this study was to determine which factors that were generally accepted in teaching adults were perceived by the trainees to be present in their learning experience at the training offered by Project A.

Qualitative data collected by Project A provided the researcher with the opportunity to explore participants' perceptions on whether professional development trainers were using those generally accepted teaching principles advocated by leading adult educators. Using documentary material that was written by participants in response to a questionnaire to evaluate training, data were gathered and analyzed providing useful information to the study. These data provided descriptive information, verified emerging hypotheses, and tracked change in participants' learning. Finding different materials and asking relevant questions related to the research problem directed the conduct of the qualitative research (Merriam, 2001). In this study, Project A collected several documents that helped address the research questions. The primary documents included the PALS survey that addressed participants' perceptions of those principles generally accepted as being effective. The secondary documents were participant satisfaction surveys completed at the end of the training. The final set of documents was action plans created by the participants that delineated the intended implementation plan to use the newly learned skill in the classroom.

Research Design

The research design for this study was the case study. According to Merriam (2001), a case study was an intensive, descriptive analysis of a single entity, around which there are boundaries. The purpose of a case study was to identify and explain specific issues and problems of practice. The researcher reviewed data collected at a training session by Project A and evaluated the effectiveness of the training based on the perceptions by the participants of the use of factors generally accepted in teaching adults and analyzed factors that affected teachers' perceptions.

Case study designs may involve single or multiple case types and can be characterized as being particularistic, descriptive, and heuristic (Merriam, 2001). This study was particularistic because the study focused on a particular event, in this case, training provided to teachers by Project A. This case met the conditions for a particularistic case study because data had been collected by Project A as part of the project's evaluation process of their efficacy in delivering professional development. These data provided information about one event—the training. The analyses of the data fit a defining characteristic of a pluralistic case study because it suggested to the reader what to do or what not to do in a similar situation (Merriam, 2001).

Before conducting the study, the University of Florida Institutional Review Board's permission to analyze the secondary data was obtained. Prior to conducting the analyses of the data, permission was obtained from the principal investigator of Project A.

Sampling and Description of the Subject

After first selecting the case-the bounded system to be investigated, qualitative researchers generally used nonrandom, purposeful sample selection (Merriam, 2001). For this study, participants who attended a training session offered by Project A to teach a new instructional strategy to teachers were purposefully selected. According to LeCompte and Preissle (1993), the term "selection" was more descriptive than "sampling" when discussing the method used to identify a single-case study site. Selection only required the researcher to "delineate precisely the relevant population or phenomena for investigation, using criteria based or theoretical considerations, or some other considerations" (Le Compte & Preissle, 1993, p. 57). The professional development model was a cyclical process that contained four processes: selection of the research based practice, training to teachers, classroom implementation support, and evaluation of the training plan for the research based practice. The training session selected was a sample of the many training sessions offered by Project A. Training sessions offered by Project A were designed as part of the professional development model created by the project. The purpose of this study was to determine which factors that were generally accepted in teaching adults were perceived by the trainees to be present in their learning experience at the training offered by Project A. The training session studied in this case was provided to teachers to help address the needs of students who were having difficulty learning the principles of algebra.

The training sessions offered by Project A served teachers of all grade levels. Project A had been in existence since 1995 and was a resource for professional development to teachers in the state. Announcement of the training was mailed by Project A to staff development directors, math program specialists, and instruction and curriculum directors in each Florida County. The recipients of the announcement shared the opportunity offered to attend with teachers in their districts. Teachers who were interested completed the application and sent it to Project A. Project A then scored the applications using selection criteria that included demonstration of expertise in the applicant's certification subject (teaching math or special education), obtaining a fair representation of teachers from different areas of the state, and requiring evidence of their applicant's principal's support to implement the learned skill upon return to the classroom. Project A selected a total of 25 teachers to participate in the training session. The purpose of the training was to develop a set of lesson plans based on a new instructional strategy to help teach the principles of algebra to diverse learners. The training length was 5 consecutive days and each day had 8 hours of training.

The participants were teachers who taught at different grade levels in elementary and secondary schools. More specifically, six teachers taught in grades kindergarten through second grade. There were eight teachers who taught in the third through fifth grades. There were seven teachers who taught in the sixth through eighth grades. Finally, there were four teachers who taught in the ninth through twelfth grades.

Data Analysis

The data analyzed included the three sets of documents listed in the documents section above. The PALS recorded the participants' perceptions of the use of techniques generally accepted in teaching adults. A second source of written records included participants' written evaluations on the training sessions. The final source of written records were copies of action plans developed by the participants on how they planned to implement the newly acquired instructional strategy in their classrooms.

Participants completed the PALS survey prior to the beginning of the training and then again upon completion of the training sessions. The analysis of the PALS survey provided evidence of participants' perception of the extent to which practitioners supported the collaborative mode of teaching and learning. The collaborative mode of teaching and learning for adults was based on a curriculum that should have been learner-centered. It capitalized on the learner's experience and assumed that adults were self-directed. The analysis provided the researcher with data on the following principles of teaching adults: learner-centered activities, personalizing instructions, relating instruction to experience, assessing participant needs, climate-building, participation by adult learners in the learning process, and demonstrating flexibility for personal development (Conti, 1978; Cross, 1981; Knowles, 1984, Brookfield, 1986).

The researcher then analyzed the participants' evaluations of the training to determine whether or not the trainees perceived experiences that contained activities that supported the collaborative mode of teaching and

capitalized on the learner's experience. Participants provided written responses to evaluate the conference that the researcher used to identify common comments or words that would help address the research question. According to Merriam (2001), a researcher must adopt some system for coding and cataloging the documents, and it helped to start with basic descriptive categories early in the coding. A coding system was developed that rated key words that described PALS subscales in two categories: learner-centered comments= 1, and mentioned teacher-centered comments=2. Key words that described PALS subscale on learner-centered activities were selected from statements that indicated that the participants perceived the trainers practicing behaviors that encouraged trainees to take responsibility for their own learning and established activities that were learner-centered (Guskey 2000; Conti, 1985a; Conti, 1985b). Key words that described PALS subscale on personalizing instruction activities were selected from statements where participants perceived that trainers determined learners preferred learning style and developed activities to accommodate these learning styles (Graham 1988; Conti, 1985a; Conti, 1985b; Knowles, 1984). Key words that described PALS subscale on relating teaching to student experience were selected from statements that described activities that linked to participant's work experiences (Knowles, 1984). Key words that described PALS subscale on assessing participant needs were selected from statements that demonstrated participant's perceptions that the trainers assessed what participants wanted to achieve at this training and statements that reflected participant's understanding on how the new instructional strategy

helped them perform better as teachers (Knowles, 1984). Key words that described PALS subscale on climate building activities were selected from statements that determined participants' perceptions on whether or not the instructor/trainer built an environment that facilitated learners' exploration, built self-concept, and developed problem-solving abilities and social skills without fear of failure (Guskey 2000; Knowles, 1984). PALS subscale on participation in the learning process key words were selected from statements that reflected participants influence on the design and decision making process of the training (Guskey 2000, Hendricks, 2001; Conti, 1985a; Conti, 1985b; Knowles, 1984). PALS subscale on flexibility for personal development by students key words were selected from statements that reflected participant's perception that the instructors believed and demonstrated that their personal fulfillment was a central aim of the training (Conti, 1985a; Conti, 1985b)

The coding system was used on the participants written evaluation of the training. In these written evaluations the participants responded to questions that asked for their expectations of the training, information that they would use immediately, the importance and relevance of the information learned, and information not included in the training that may have been beneficial to participants as they decided to implement, such as materials to use in the classroom, more time to practice during the training, more time to discuss with colleagues at the training, and the like. Finally, the research analyzed the plans for implementation to determine the degree of participants' knowledge of the new skill and their plans to use it in the classroom.

The goal statements of the implementation plans were coded into 2 categories. The first category included goal statements that specifically addressed the use of the CSA or STAR strategy. The second category included goal statements that did not specifically address the CSA or STAR strategy.

Validity and Reliability

Internal Validity

In qualitative research, validity was judged by how truthful the findings of the study were and that the questions asked were the questions answered (Merriam, 2001). Internal validity was based on the match between the findings of the case study and reality (Merriam, 2001). In this case, teachers' responses were the primary source of the data collected and analyzed from survey responses and self-assessments.

According to Yin (1994) & Merriam (2001), using multiple sources of evidence was a major strength of a case study data collection. In this study, triangulation of the data analyzed was used to ensure internal validity. There were multiple sources of documents collected by Project A that were later reviewed by the researcher. The researcher reviewed three sources of documents, the PALS scale, the evaluation of training, and the implementation plans to identify the presence of factors generally used to train adults and to assess internal validity.

Validity and Reliability of the PALS

Validity and reliability of the PALS survey were tested as part of Conti's 1979 doctoral dissertation. He constructed a five-point Likert scale to record

practitioner responses to a number of items that were based on collaborative principles but phrased in behavioral terms compatible with realistic experiences of practitioners. Two juries of adult education professors and 57 practitioners in six separate programs tested the PALS instrument for construct, content, and criterion-related validity. Testing for reliability was undertaken in phase two of the field-testing. This was done by twice administering the scale to 23 adult basic-education practitioners in Chicago, and then comparing the congruence of the scores. Content validity was established by correlating each item in the instrument to the criterion measure of total score (Conti, 1978). Conti used the test-retest method to establish the reliability of PALS, yielding a reliability coefficient of .92 (Conti, 1978). The outcome of the study was a 44-item rating scale that Conti stated could be used to assess the effectiveness of collaborative modes to produce significant learning gains or to identify themes and topics around which in-service training activities could be designed for staff development (Brookfield, 1986; Conti, 1985a; Conti, 1985b). High scores on PALS reflected a learner-centered approach to the teaching-learning transaction. Low scores on PALS denoted a preference for the teacher-centered approach in which authority resides in the instructor. The mean for PALS is 146, with a standard deviation of 20 (Conti & Welborn, 1986).

In this study, the testing procedures used when administering the PALS survey to participants were a threat to the internal validity. Testing was considered a threat to internal validity because the participants may have remembered items from pre-tests (Witte & Witte, 1997). Participants in this study

completed the PALS scale pre-test before training; then post-test after completing the five days of training. There was a possibility that participants remembered items from the PALS pre-test because the PALS scale used as the post-test had identical questions in the same order as the PALS scale pre-test. Because the PALS scale is a 44-item scale, it would require any participant to remember an extensive number of questions. Therefore, the number of items in the test may have reduced the threat to the internal validity. Possible solutions to the threat of testing procedures could have been the use of an alternate form of the test, longer studies, or control groups (Witte & Witte, 1997). In this study, the researcher had no control over the design of the testing procedures and, therefore, relied on the data collected by Project A.

External Validity

External validity was measured by whether or not the findings of a study could be applied to other settings or groups of people. Researchers referred to this as generalizability (Merriam, 1998; Witte & Witte, 1997; Yin, 1994). In case-studies research, a single-case or small nonrandom sample was chosen because the researcher wanted to understand the particular phenomenon and not necessarily generalize to a larger population (Merriam, 2001). There may be a possibility for readers to generalize based on the explicit description of the study then having the readers make their own comparisons.

In this study, the researcher provided detailed description of the professional development agency and the participants of the training session.

These narratives contained sufficient detail so that the reader could judge the applicability of the findings to other contexts.

Reliability

The concept of reliability was based on the ability to replicate a study given the methods described in the study (Merriam, 2001; Witte & Witte, 1997; Yin 1994). In qualitative research, reliability was measured by the consistency of the results and the dependability of the data collected. Qualitative research most often occurred in natural settings and sought to describe and explain what happened within the context of where it was happening; therefore replication was difficult to achieve (Merriam, 2001; Yin, 1994). In this study, the data collected at the training session were used to obtain a description of a training event. The information collected from the documents contained information necessary to address the research questions and describe the event in terms of the perceptions of the participants of generally accepted principles to teach adult learners in a training session. To obtain results consistent with the data collected, the researcher addressed reliability threats by using multiple sources of data to triangulate the results. Triangulation strengthened reliability and internal validity (Merriam, 2001).

Investigator Bias

In qualitative research, a researcher is the primary tool for data collection. Therefore, the researcher's bias can influence the quality of the findings (Merriam, 2001; Yin, 1994). In this study, the data analyzed were secondary data collected by Project A. Teachers who participated in the professional

development training offered by Project A and whose responses were analyzed for this study were not aware that their participation in the training would be used for a research study. Because this fact eliminated test administrator bias, any researcher biases did not affect the data collection process. The triangulation of multiple sources of data ensured consistent and dependable analysis of the study, although opportunities for excluding data contradictory to the researcher's views may have occurred in the process of analyzing participant responses in the evaluation of the training and the plans to implement the new instructional strategy. The analysis of the PALS survey was a quantitative analysis, but investigator bias was not applicable to this portion of the study because the PALS survey was a validated survey instrument with procedures to score and interpret results (Conti, 1978).

Ethical Issues

In qualitative research, ethical dilemmas were likely to emerge with regard to data collection and the dissemination of the findings because of the researcher-participant relationship (Merriam, 2001). In this study, the relationship between researcher and participant was non-existent because the information used in this study was gathered by Project A and given to the researcher to analyze after the training had been designed and delivered. The name of the project and the name of the participants have remained anonymous through the use of pseudonyms in all reports of the study results. The Project A professional development participants were asked to sign informed consent forms prior to collecting data by the Project A staff in compliance with their institutions' requirements. The study

was approved by Project A's Institutional Review Board. The University of Florida's Institutional Review Board (UFIRB) approved the use of secondary data for this study. Results of the study were supplied to Project A's principal administrator.

Summary

Chapter 3 was a discussion of the method and documents used in this study. A qualitative case study with descriptive methods of data collection was employed. One set of data was the analysis of the PALS survey. This provided descriptive statistics of the perceptions of participants of the use of factors and techniques generally accepted when teaching adults. Triangulation of data included the PALS analysis, written records of participant satisfaction, and participant's plans to implement the new instructional strategy learned at the training into the classroom.

Chapter 4 covers the results of the PALS surveys, evaluation information, and implementation plans completed by participants of a training session provided by Project A. Results are reported of the overall perception on whether the training was teacher-centered or learner-centered as measured by the PALS survey as well as factors generally accepted in teaching adults that were perceived to present at the training. Chapter 4 also covers results on whether or not years of teaching experience and highest level of education had a relationship with the perception of adult learning principles at this training.

CHAPTER 4 DATA ANALYSIS AND RESULTS

Introduction

The study of a typical professional development session by Project A provided the opportunity to evaluate professional development and determine how different factors generally accepted in teaching adults were perceived by the participants and how those factors affected their learning experience, and which factors enabled these participants to implement the new instructional practice. These principles included learner-centered activities, personalizing instructions, relating teaching to student experience, assessing participant needs, climate-building, student participation in the learning process, and flexibility for personal development by students (Brookfield, 1986; Conti, 1978; Cross, 1981; Knowles, 1984). In addition, the study analyzed how the participants' level of education and number of years of teaching influenced their perceptions of the principles listed above.

Teachers as adult learners traditionally have participated in professional development to improve their teaching skills. Adult learners typically have preferred to take an active role in their educational process. This preference has required professional developers to adjust training to include an approach where they become facilitators of the learning process (Barr & Tagg, 1995). This

approach encouraged teachers to become active participants in their learning process.

Project A was a unique institution to study since a great number of teachers in Florida received professional development in research-based teaching skills on a yearly basis from this project. In this chapter, the procedures for data collection and an analysis of the data for the research questions that guided this study are presented. Specifically, this study addressed the following research questions:

1. Which factors that were generally accepted in teaching adults were perceived by the trainees to be present in their learning experience at a training offered by Project A?
2. Was there a relationship between the following variables, the years of teaching experience plus the level of education of the participants, and the perception by the participants that they had been taught using generally accepted teaching principles that were considered to be most effective in adult teaching?

This chapter contains two sections. The first section is a discussion of relevant information related to the first research question. In this section, the results from the PALS survey, the participants' evaluation of the training sessions, and a review of participants' plans to implement the new instructional skill learned at the training were analyzed to determine participants' perceptions of factors generally accepted in teaching adults that were present at the training. The second section is a discussion of the analysis between the relationships of years of teaching experience plus level of education of the participants to the perception by the participants of those generally accepted teaching principles of adult learners.

Data Collection

Participants completed the PALS survey prior to the beginning of the training and then again upon completion of the training sessions. In addition to the participants completing the PALS survey, they provided data on their years of teaching experience, levels of education, and current teaching assignments. At the completion of the training, participants also completed a session evaluation survey that provided participants the opportunity to share their perceptions of the training sessions. Finally, participants developed implementation plans as part of the training. Copies of these plans were analyzed for this study.

Description of Respondents

The PALS survey was distributed to participants at a training offered by Project A. All but one of the 25 participants completed the PALS survey for a 96% response rate. The respondents were teachers in the Florida public school system. The respondents' grade-level teaching responsibilities ranged from kindergarten through twelfth grade. More specifically, twelve (50%) teachers taught in grades ranging from kindergarten to fifth grade, eight (33%) teachers taught in grades six to eight, and 3 (13%) teachers taught in grades nine to twelve. One (4%) teacher failed to report grade level taught.

All the participants were female and the subject areas taught by respondents and represented in this study were mathematics, exceptional student education (ESE), and elementary education. More specifically, five (21%) of the participants taught exceptional student education (ESE), 12 (50%) of the participants taught math, and six (25%) of the participants taught elementary

education. One (4%) respondent did not respond to this question. Table 4-1 provides a summary of the background information for each of the participants in this study.

Table 4-1. Participants' self-descriptions

Participant	Grade	Yrs. Teaching	Education*	Subject
Teacher 1	6	11	MA	Math
Teacher 10	8	6	BA	Math
Teacher 11	5	3	MA	Elementary Education
Teacher 12	7	3	BA	ESE
Teacher 13	6-8	23	BA	Math
Teacher 14	K-5	4	BA	ESE
Teacher 15	1	3	BA	Elementary Education
Teacher 16	3-5	21	MA	ESE
Teacher 17	8	13	MA	Math
Teacher 18	9-12	31	MA	Math
Teacher 19	6	7	BA	Math
Teacher 2	6-8	2	BA	ESE**
Teacher 20	-	2	MA	-
Teacher 21	K-5	24	BA	Elementary Education
Teacher 22	K-5	-	-	Math
Teacher 23	K-5	17	BA	Elementary Education
Teacher 24	8	6	BA	Math
Teacher 3	K-4	7	MA	Math
Teacher 4	1	11	BA	Elementary Education
Teacher 5	9-12	7	MA	Math
Teacher 6	K-5	2	BA	ESE
Teacher 7	4	13	MA	Elementary Education
Teacher 8	3-5	25	Specialist	Math
Teacher 9	9-12	6	MA	Math

* BA = Bachelor's of Arts or equivalent; MA = Master's of Arts or equivalent.

** ESE = Exceptional Student Education

Years of Teaching Experience

The range of teaching experience in the group of participants was great, from two years to 31 years—a span of 29 years. More specifically, three (13%) of the participants had two years of teaching experience, three (13%) had three years of teaching experience, and one (4%) participant had four years of

teaching experience. Three (13%) participants had taught for six years and three (13%) for seven. Two (8%) participants had eleven years and two (8%) had 13 years of teaching experience. Of the remaining teachers, one each had 17, 21, 23, 24, 25, and 31 years (24%). One (4%) failed to list their years of teaching experience.

Table 4-2. Years of teaching experience

N	Mean yrs. teaching	Median	Modes	Std. Dev.
21	10.29	7.5	2, 3, 6, 7	8.83

Of the participants, the mean of years of teaching experience was 10.29 years, the median was 7.5 years, and the distribution had four modes, 2, 3, 6, and 7 years. The standard deviation was 8.83 years. Table 4-2 provides descriptive statistics of the participants' years of teaching experience.

Table 4-3. Level of education of respondents

Level of education	Number	% of total number of respondents
Bachelor's	12	50%
Master's	9	38%
Specialist	1	4%

Level of Education of Respondents

Participants at this training were professional teachers. In Florida, to qualify to become a teacher requires having a bachelor's degree. Therefore, the minimum education of the participants at this training was a bachelor's degree (Table 4-2). Half the participants (50%) at this training had obtained a bachelors degree as the highest level of education. Of the 24 respondents, two (8%) did not respond

to the level of education question. Nine (38%) respondents had master's degrees, and one (4%) respondent had an education specialist degree as their highest level of education.

Analysis of Research Question #1

To examine which factors generally accepted in teaching adults were perceived by the trainees to be present in their learning experience at a training offered by Project A, responses to the PALS survey and participants' evaluations of the training were analyzed. Participants' plans for implementation also were analyzed.

Analysis of the PALS surveys

Respondents completed the PALS survey twice, once prior to the beginning of training and again upon completion of the training. The purpose of administering the PALS survey before training was to determine, based on andragogical theory, participants' expectations of the training, that is, whether they expected the training to be more teacher-centered or more learner-centered. Upon completion of the training, the PALS survey was again administered to determine the participants' perceptions on whether they found the training to be teacher-centered or learner-centered. Statistical analyses were also utilized to determine whether or not the factors generally accepted in teaching adults were perceived by participants to be present in the training. Table 4-4 presents the overall PALS scores of the participants prior to and upon completion of the training sessions.

In their study, Conti and Welborn (1986) found the mean for their PALS surveys was 146 (standard deviation of 20). Scores below 146 meant the training was anticipated to be or proved to be teacher-centered; scores above the indicated a preference for or perception of learner-centered instruction in keeping with the best practices of andragogy (Knowles 1970). The mean for all respondents in this study prior to participating in the training reflects their average perception of what they expected from the training. The mean of 127.38, which was below the mean of the baseline PALS survey of 146 (Conti & Welborn, 1986), indicated that the participants' perceptions prior to training was that the trainers would be more teacher-centered, thus exert more authority over the training activities. After the training, the PALS survey mean increased by 16.72 points, but was still below the watershed mean of 146 (Conti & Welborn, 1986). This indicated that the participants in the Project A study perceived the trainers to be less teacher-centered than they had anticipated, but not to the degree that they had hoped for prior to participating in the training.

Table 4-4. Comparison of PALS scores prior to and after training.

Time	N	Mean PALS score	Std. Dev.
Prior to training	24	127.38	21.60
After training	24	144.10	17.98

The overall scores on the PALS survey also can be broken down into seven factors, or subscales. The scores on each subscale relate to the perceptions of certain principles of adult learning. These principles included Subscale 1 (Learner-Centered Activities), Subscale 2 (Personalizing Instruction),

Subscale 3 (Relating to Experience), Subscale 4 (Assessing Participants Needs), Subscale 5 (Climate-Building), Subscale 6 (Participation in the Learning Process), and Subscale 7 (Flexibility for Personal Development). The subscales scores perceived by the trainees to be present in their learning experience at the training offered by Project A are listed in Table 4-5.

Table 4-5. PALS factors perceived by participants (n = 24).

Subscale/Factor	Participants' Mean(SD)	Conti & Welborn Mean(SD)*
1. Learner-Centered Activities	36.54 (6.76)	38 (8.3)
2. Personalizing Instruction	30.25 (5.36)	31 (6.8)
3. Relating to Experience	22.29 (4.83)	21 (4.9)
4. Assessing Participants' Needs	15.13 (2.94)	14 (3.6)
5. Climate-Building	15.83 (3.41)	16 (3.0)
6. Participation in Learning Process	15.13 (3.38)	13 (3.5)
7. Flexibility of Professional Development	8.94 (2.72)	13 (3.9)

* Conti & Welborn (1986).

In this study, subscale 1 (Learner-Centered Activities) with a subscale value of 36.54, Subscale 2 (Personalizing Instruction) with a subscale value of 30.25, Subscale 5 (Climate Building) with a subscale value of 15.83, and Subscale 7 (Flexibility for Personal Development) with a subscale value of 8.94 had mean scores lower than the mean PALS subscale values of Conti and Wellborn (1986). This indicated that participants did not perceive that the activities were learner-centered and that personalized instruction, climate-building, or flexibility for personal development were not exhibited by trainers. In

other words, a collaborative mode of teaching was not sensed during the training for these factors.

On a more positive note, there were some subscale mean scores in this study that were above the baseline PALS subscale value. Those scores were: Subscale 3 (Relating Experience) with a subscale value of 22.29, Subscale 4 (Assessing Participants Needs) with a subscale value of 15.13, and Subscale 6 (Participation in Learning Process) with a subscale value of 15.13. These scores indicated that participants perceived these factors were successfully employed by trainers in a collaborative teaching mode.

Furthermore, a comparison of the subscale values obtained from the PALS survey prior to beginning training with the PALS survey upon completion of training (Table 4-6) indicated that participants perceptions prior to training was that the under each subscale trainers would be more teacher-centered. After training, all subscales values increased except for Subscale 7 (Flexibility of Professional Development) that decreased by 18.29%. The subscales that indicated large increases were Subscale 2 (Personalizing Instruction) increased by 19.21%, Subscale 3 (Relating to Experience) increased by 17.71%, Subscale 4 (Assessing Participant Needs) increased by 23.89%, and Subscale 6 (Participation in Learning Process) increased by 27.82%. This indicated that participants perceived the training to be more learner centered in most of the factors generally accepted as effective in teaching adults except for their perception of trainers not being flexible in modifying the professional development based on participants' needs.

Table 4-6. Comparison of PALS factors prior to and after training (n = 24).

Subscale/Factor	Prior to Training(SD)	After Training(SD)	Percent Change
1. Learner-Centered Activities	33.25(6.84)	36.54 (6.76)	9.90
2. Personalizing Instruction	25.38(6.62)	30.25 (5.36)	19.21
3. Relating to Experience	18.93(4.81)	22.29 (4.83)	17.71
4. Assessing Participants' Needs	12.21(3.11)	15.13 (2.94)	23.89
5. Climate-Building	14.83(2.97)	15.83 (3.41)	6.74
6. Participation in Learning Process	11.83(3.42)	15.13 (3.38)	27.82
<u>7. Flexibility of Professional Development</u>	<u>10.93(3.06)</u>	<u>8.94 (2.72)</u>	<u>-18.29</u>

Two sets of documents were also analyzed to determine whether or not comments made by the participants reflected the presence of any of the factors that were generally accepted in teaching adults. The first set of documents was the participants' written evaluations of the training sessions and the second set was the participants' plans to implement the new instructional strategy.

Participants' Written Evaluation of the Training Sessions

Participants completed an evaluation form provided by Project A (Appendix D) to provide comments on their degree of satisfaction with the training experiences. The researcher reviewed the documents to code comments that related to the seven subscales in the PALS survey (Table 4-7). The following is a discussion on the analysis of the evaluation forms.

In reviewing these documents, four comments were made by participants related to Subscale 1 (Learner-Centered Activities). All four comments were tallied within the following teacher-centered categories of "needed more time to

work in groups," "limit the time that the trainers speak," and "will use strategies modeled." These participants' comments indicated that they perceived the training sessions to be more teacher-centered. Participants who commented on this topic felt that the time to work in groups was not sufficient to successfully discuss with other participants their understanding of the new instructional skill. The four comments were useful, but did not provide the researcher with a strong indication that the majority of the participants perceived the activities were teacher-centered.

Table 4-7. PALS factors perceived by participants in written evaluations of training.

Subscale	Comments Related to Factors	Learner-Centered	Teacher-Centered
1	Learner-Centered Activities	0	4
2	Personalizing Instruction	0	0
3	Relating to Experience	47	3
4	Assessing Participants Needs	5	0
5	Climate Building	11	0
6	Participation in Learning Process	0	7
7	Flexibility of Professional Development	1	0

For Subscale 2 (Personalizing Instruction), the participants failed to make any comments. Consequently, it was not possible to determine if the trainers/training developed activities that reflected personalization of instruction.

For Subscale 3 (Relating Experience), there were 50 comments made by the participants. Forty-seven comments were tallied within the following learner-centered categories: "will use accommodations available for ESE students," will use more cooperative learning strategies," will include in my lesson plans," "will align to state standards," "will infuse strategically in unit plans," and "will use technology in using new strategy." Three comments were tallied within the following teacher-centered categories: "too much information received," and "did not cover a topic I was interested in." The large number of comments in this subscale indicated that participants perceived a learner-centered approach to relating the training to their work experiences.

Subscale 4 (Assessing Participants' Needs) elicited five comments. All were classified within the following learner-centered categories: "learned things that will make me a better teacher," "I will better impact my students' learning," "accomplished important work by collaborating with fellow teachers," and "good clarification of algebra terms." These participants' comments indicated that they perceived the training sessions to be more learner-centered, although the total of five comments did not provide the researcher with a strong indication that learner-centered activities related to this subscale were perceived by the majority of the participants.

For Subscale 5 (Climate-Building), there were 11 comments made by participants. All were tallied within the following learner-centered comment categories: "trainer was an excellent facilitator," "very motivating workshop," "thank you for allowing to be a part of this training," "learned from peers," and

"training was well planned and organized." These comments indicated that nearly half the participants perceived that the climate was conducive to a positive learning experience and encouraged professional interactions among the participants, although the total of 11 comments did not provide a strong indication that the majority of participants perceived the activities related to this subscale to be learner-centered activities.

For Subscale 6 (Participation in Learning Process), there were 7 comments made by participants. All 7 comments were tallied within the following teacher-centered comment categories: "needed more time to discuss and process content," "needed more in-depth learning of topic," and "should have used own lessons to work on," and "was not clear on the outcomes of the training." The total of 7 comments did not provide a strong indication that the majority of the participants perceived the activities related to this subscale to be teacher-centered activities.

Subscale 7 (Flexibility for Personal Development) elicited only one comment, that the participant felt treated as a professional. This comment was categorized as learner-centered, but could not provide a strong indication that the participants perceived this subscale as present in the training.

In summary, the analysis of the participants' written evaluations of the training sessions indicated that, in relating the training to participants' work experiences (Subscale 3), the majority perceived trainers to be learner-centered. Subscale 5 (Climate-Building) was perceived by some participants to also be

present as learner-centered in the training, but not as strongly as was true for Subscale 3 (Relating to Experience).

Analysis of Participants' Plans to Implement the New Instructional Skill

As part of the training experience, participants developed plans to implement the new instructional skill learned at the training. This activity addressed Subscale 3 (Relating to Experience), one of the factors generally accepted to be effective in teaching adults where the training was related to the participants' work experiences. A participant's plan included a statement of a goal for improvement. The plan then listed at least three sources of information that the teacher would use to reach the goal. Finally, the plan included a timeline for implementation. The researcher reviewed the participants' goals for implementation to determine whether or not the participants gained sufficient knowledge to be able to use the new information they had learned.

The goal statements were divided into 2 categories. The first category included goal statements that specifically addressed the use of the CSA or STAR strategy. The second category included goal statements that did not specifically address the CSA or STAR strategy.

There were 4 goal statements that specifically addressed implementing the new instructional skill learned at the training. These statements stated that the participants would use the new instructional strategies in their lessons and then determine if students improved in learning algebra. The 4 goal statements in this category either did not provide a strong indication that the majority of the participants had learned the new skill well enough that they could use it in their

classrooms or may have shown that the participants did not agree that the skill was superior to their current method.

There were 24 goal statements that addressed using activities learned at the training. These goal statements did not indicate that they would be implementing CSA or STAR, but rather would consider incorporating important topics in teaching algebra that were presented at the training. Among the different topics mentioned in the plans were that participants became more aware of the need to include specific instructional strategies to help teach algebraic thinking.

The researcher also noted that, among these goal statements 11 statements addressed using technology, manipulatives, and strategies in special education modeled by the trainers. The total of 24 goal statements that did not address the use of the CSA or STAR instructional strategy provided a strong indication that participants had not yet learned the new instructional strategy well enough to implement it.

In summary, participants' perceptions prior to attending the training were that trainers would be more teacher-centered than learner-centered. Upon completion of the training, participants perceived the training to be more learner-centered than they expected, although the overall perception was still that the training was teacher-centered. After triangulation of the three sources of data (PALS survey, evaluation of the training, and implementation plans), the majority of participants perceived Subscale 3 (Relating Experience) to be the one factor

that was used by trainers at the training session to teach a new instructional skill in algebraic thinking.

Analysis of Research Question #2

Was there a relationship between the following variables, the years of teaching experience, the level of education of the participants, and the perception by the participants that they had been taught using generally accepted teaching principles that were considered to be most effective in adult teaching? To examine this question, the PALS scores were descriptively analyzed to determine if there was a difference in the scores related to years of teaching experience and highest level of education. Tables 4-8 and 4-9 report these data.

Table 4-8. Comparison of PALS scores and years of teaching experience.

Years of Teaching	Number	PALS Mean	Minimum Score	Maximum Score	Standard Deviation
0-4	7	137.43	102	162	20.44
5-9	6	133.33	109.5	151	15.14
10-14	4	149.5	126	164	16.49
15-19	1	164	164	164	0
20-25	4	157.38	143	164.5	9.86
26 +	1	165	165	165	0

The PALS scores comparison to years of teaching experience showed that participants with ten or more years of teaching experience perceived the trainers to be more learner-centered than teacher-centered. Participants with 15 to 19 years of teaching experience and the one participant who had over 26 years

of teaching experience were the ones who perceived the most use of adult learning principles by the trainers.

Even though the PALS scores and highest level of education showed differences in the mean scores, the range between the minimum score and the maximum score within each level of education was too great for there to be a strong indication that there was a relationship between the highest level of education attained and a positive perception of the learning experience. The standard deviation within each level of education was also too broad to support a relationship.

Table 4-9. Comparison of PALS scores and highest level of education.

Highest Level of Education	Number	PALS Mean	Minimum Score	Maximum Score	Standard Deviation
Bachelors	12	146.75	122	164.5	14.97
Masters	10	139.45	102	165	21.85
Specialist	1	163	163	163	0

Summary

This chapter presented the results of a study of a typical professional development session offered by Project A. It provided the opportunity to evaluate professional development and determine whether factors generally accepted as effective in teaching adults were perceived by the participants to be included in the session, how those factors affected the participants' learning experience, and which factors enabled the participants to implement the new instructional practice. These principles included learner-centered activities, personalizing instructions, relating teaching to student experience, assessing participant needs,

climate-building, student participation in the learning process, and flexibility for personal development by students (Brookfield, 1986; Conti, 1978, Cross, 1981; Knowles, 1984). Additionally, the study analyzed whether the participants' level of education and years of teaching experience related to their perceptions of certain principles listed above.

The PALS survey results indicated that participants' perceptions prior to attending the training were that trainers would be more teacher-centered than learner-centered. Upon completion of the training, participants perceived the training to be more learner-centered than they had expected, although the overall perception was still that the training was teacher-centered. After triangulation of the three sources of data (PALS survey, evaluation of the training, and implementation plans), the majority of participants perceived Subscale 3 (Relating Experience) to be the one factor that was used by trainers at the training session they participated in to learn a new instructional skill in algebraic thinking.

This study also showed a strong indication that participants with ten or more years of teaching perceived the training to be learner-centered, while participants with fewer than ten years of teaching experience perceived the training to be teacher-centered. The study did not determine if there was a relationship between the highest level of education and the perception that the training used factors generally accepted in teaching adults.

In this study, the findings suggest what might be included and not included in planning training to effectively address certain factors that influence adult

learning. In Chapter 5, the implications of this study are discussed, and recommendations are made for further research in this area. Additionally, the implications of the findings of this study are discussed in relation to professional development needs for teachers teaching algebraic thinking.

CHAPTER 5 DISCUSSION AND RECOMMENDATIONS

Summary

Teachers as adult learners frequently participated in professional development to improve their teaching skills. When teachers improved their teaching skills, students were better able to learn the required content mandated by Florida's educational standards. Based on the theory of andragogy as presented by Knowles (1984), professional development designed for teachers should include training strategies that address the specialized needs of teachers as adult learners (Conti, 1978; Cross, 1981; Guskey 2000; Knowles, 1984).

Project A was an agency that provided professional development to a large number of teachers in Florida in research-based instructional skills on a yearly basis. This raised an important question: did training offered for teachers by Project A incorporate principles generally accepted as being effective in teaching adult learners? Professional development agencies and public school systems might find this research contains helpful information for planning professional development programs that promote school improvement and teacher change.

Findings and Discussion

There is a common belief among educators and the Florida Department of Education administrators who approve funding for Project A that professional

development projects such as Project A had knowledge of principles generally accepted as being effective in teaching adults and, therefore, included these principles in professional development offerings for teachers. The Principles of Adult Learning Scale (PALS) developed by Conti (1978) was distributed to participants prior to the beginning and then again at the conclusion of a five-day training session in a new instructional strategy to help teach algebraic thinking. This survey measured which of these factors were perceived by the trainees to be present in their learning experience in the training session. The overall score of the PALS survey helped determine whether participants perceived the training to be learner-centered or teacher-centered. The PALS survey included seven subscales or factors that were also considered. Twenty-four teachers responded to the PALS survey at the training session. All respondent were female teachers. Respondents taught one of these three subject areas: mathematics, special education, or elementary education. Keeping in mind that teachers whose responses scored high on the PALS survey meant that they perceived a learner-centered approach was used by the trainers and teachers whose responses scored low on the PALS survey meant that they perceived a teacher-centered approach was used by the trainers, the results showed that teachers expected to be trained in a teacher-centered approach prior to beginning training. Results also showed that, upon completion of the training, teachers perceived the training to be more learner-centered than they expected, but overall the training was perceived to be essentially more teacher-centered than learner-centered.

The data were also analyzed to determine which factors generally accepted as being effective in teaching adults were perceived to be present at the training. These factors included learner-centered activities, personalizing instructions, relating teaching to student experience, assessing participant needs, climate-building, student participation in the learning process, and flexibility for personal development by students (Brookfield, 1986; Conti, 1978; Cross, 1981; Knowles, 1984). The triangulation of the PALS survey results, the participants' evaluations of the training, and their plans to implement the new instructional skill learned indicated that participants perceived only one factor utilized by trainers to be learner-centered, that is, relating the new instructional strategy to participants' work experience. The other factors that would be considered learner-centered were not perceived by the majority of the participants to be used in the training.

Additionally, the data were analyzed to determine if there was a relationship between years of teaching experience combined with the level of education of the participants and the perception by the participants that they had been taught using generally accepted teaching principles that were considered to be effective in adult teaching. The results of the second PALS survey indicated that trainees who had ten or more years of teaching experience perceived the training to be learner-centered and participants with less than ten years of teaching experience perceived the training to be teacher-centered. In the category of level of education, the data indicated that the level of education of the participants had no impact on the second PALS survey scores.

The findings of this study reflect the findings of Conti (1985), who determined that adults learned best in collaborative situations, that is, learner-centered. In this study, it was found that participants did not perceive the training to be learner-centered. The analysis of the study data indicated that participants did not learn the new instructional strategy well enough to be able to implement it in their classrooms. This was attributed to an absence in the teaching method used during training of those factors that are generally accepted as being effective in teaching adults. In another study, Conti (1989) suggested that the influence of teaching style differed according to the type of classes taken by students. The teacher-centered approach was most effective for students who were preparing to take a high school equivalency test (GED), while a learner-centered approach worked best for developmental teaching and training. Thus, the teaching style should be related to the educational needs of the learner.

Teachers as adult learners have specialized experiences and needs. For situations where the goal is to train teachers, Fullan, Bennet, and Rolheiser-Bennett (1990) proposed that teachers as learners should receive training that would increase their instructional knowledge, have opportunities to explore and discover ways to improve teaching, and participate in focused discussions with fellow teachers. In this study, participants perceived the training to be teacher-centered without sufficient opportunity to meet and discuss the content and methods with other teachers in the sessions. In the analysis of the several factors proven effective in teaching adults, there were some opportunities in the sessions to increase instructional knowledge and to share with fellow educators

instructional strategies that worked for them, yet the majority of the participants did not perceive this as being true or effective. These opportunities did help some participants learn from the training what they wanted to learn but it was not necessarily that new instructional skill the teaching of which was the explicit purpose of the training.

In addition, the findings of this study did not reflect the findings of Livneh and Livneh (1999), where the level of education predicted the level of involvement in professional development of educators. Livneh and Livneh found that adult learners with lower levels of educational attainment recognized the need to upgrade their educational skills and, therefore, attended professional development opportunities with the expectation they would learn from knowledge imparted by the trainer (teacher-centered). This case study found that the level of education did not impact the participants' perception of whether the training was learner-centered or teacher-centered. One reason for this might be that all participants were well educated and, therefore, there was not enough contrast among them.

Additionally, the study reflected the findings of Knowles (1984), that participants with more years of teaching experience were more likely to perceive the training to be learner-centered. Participants with ten or more years of teaching experience have had many more opportunities to teach and to problem-solve in their work situations to improve their teaching than those with less than ten years of experience. Hendricks (2001) in his research also found that problem solving and the context in which learning was set became increasingly

important with the age of the adult learner. The reason for this was that, with time, adults experienced real-life problems that were open-ended and required adults to make decisions that changed the course of their lives. Consequently, these participants would have been better able to recognize the trainers as facilitators (Cross, 1981; Knowles, 1984) in a learner-centered approach than teachers with less teaching experience.

Implications

Even though this study did not show that the majority of participants perceived the training to be learner-centered, the study demonstrated that the training was more learner-centered than expected by the participants. There was a 16.72-point difference in the means of PALS surveys administered before and after training, indicating that participants perceived the training was more learner-centered than they had expected. Further study should be conducted to determine if future participants could perceive the presence of adult learning principles in professional development that was specifically designed to include activities that incorporated each factor generally accepted as being effective in teaching adults.

Additionally, the fact that only one andragogic factor was perceived by the majority of participants to be present in the training, combined with only 4 of 24 teachers planning to implement the new instructional strategy learned at the training could indicate that participants did not learn the new instructional skill well enough to include it in their curriculum. Also, several comments in the participants' written evaluations of the training indicated that they did not receive

enough time to digest the topic or to practice it. In short, the training did not teach them what they had hoped to learn. The study did determine that participants believe the training to be valuable and were planning to implement many teaching strategies modeled by the trainers. Therefore failure to implement the new skill learn could also be attributed to many different factors such as availability of mentoring/modeling/support for which this study did not investigate. Another factor not included in this study could be the length of time to internalize the new skill. The five-day training may have included a vast amount of new information that was difficult to process. Therefore the following were several limitations to this research study:

- At the time of the study, Project A annually provided 32 training opportunities to 891 teachers. A case-study approach was used here to analyze a typical training offered to 25 participants by this project. Due to the small sample size, the results from one training cannot be generalized to projects that provide training similar to Project A or to the other trainings offered by Project A.
- The research depended on surveys by teachers of their perceptions of whether or not adult learning principles were presented in the training, and therefore, the research provided results as viewed by the trainees. Trainers were not surveyed to determine their self-reported knowledge of those principles generally accepted as effective in teaching adults.
- The sample that responded to the survey was selected with a rubric that determined advanced knowledge of the math content and exceptional

education content. This sample was not representative of all teachers and, therefore, cannot be generalized to all teachers of algebra who teach diverse student populations.

- The time during which the training was offered was a factor that may have prevented use of the new skill. Participants attended training in early summer. By the time the new school year started they had a new group of students and there had been a lapse of time of 2 months where the new skill was not implemented.

For Higher Education Administrators, this study may imply the need for administrators to consider developing an evaluation plan for professional development that may include assessing the presence of adult learning but not limiting to these principles only. It would be helpful to evaluate professional development by assessing participants knowledge gains, level of implementation, and reflections of the effectiveness of the professional development.

Recommendations for Further Research

There are a number of recommendations for further research and study. They include the following:

Recommendation 1: Additional studies are needed of other trainings offered by the professional development group that conducted Project A to determine if, from the perception of the participants, other sessions of these trainings differ in the instructional strategy that is taught to trainees.

Recommendation 2: Although there is some research (Brookfield, 1986; Conti, 1989a; Conti, 1989b; Guskey 2002; Loucks-Horsley, 1985) on how to

structure professional development to support adult learning. Additional research could aim to demonstrate if there is a relationship between effective professional development for teachers and improved student performance.

Recommendation 3: Additional research could seek to establish a relationship between participants' level of implementation of a new skill and the support provided by the training agency in implementing the new skill at the participant's school.

Recommendation 4: It was not determined that the perceptions of teachers would differ if the content of the professional development were different. Additional research could seek to determine whether there would be a difference in perception in different content areas such as language arts or science.

Recommendation 5: The PALS survey instrument was developed over twenty years ago. There is a need to update the survey to include indicators reflecting principles in more current terms.

Recommendations for Practice

The literature on adult learning theory and effective professional development programs provided a powerful knowledge base that offered guidelines in the design, delivery, implementation, and evaluation of professional development programs for teachers. In this study, the majority of participants did not perceive generally accepted principles in teaching adults to be present with the exception of one factor, that of the instruction relating to work experiences.

This may indicate that the trainers for Project A were in need of more training in principles of adult learning.

Summary

In summary, the purpose of the study was to determine which andragogic factors that were generally accepted to be effective in teaching adults were perceived by the trainees to be present in their learning experience at a training offered by Project A. Three sets of data were reviewed in this study: the PALS survey, participants' written evaluations of the training, and participants' written plans to implement the new instructional strategy learned at the training. The results of the overall PALS survey scores given twice to participants, prior to beginning training and then upon completion of training, indicated that participants perceived the training to be teacher-centered, even though they found it to be less teacher-centered than they had expected. In triangulation of the data, the majority of participants perceived one factor related to teaching adults to be present in the training, that of relating the training to the participants' work experience. However, the presence of this one factor, in combination with a perceived teacher-centered training, did not result in many participants implementing the new instructional strategy in their classroom. In fact, a number did not have sufficient time or interaction with instructors or peers to master the strategy. However, there are many other factors that could have contributed to non-implementation that were not part of this study, such as timing of the training, trainers' knowledge of adult learning principles, or even learning other

skills determined to be more beneficial to the participants. These other factors were suggested as further areas of research.

Additionally, this study examined whether there was a relationship between years of teaching experience combine with highest level of education and the perception by the participants that they had been taught using generally accepted teaching principles that were considered to be most effective when teaching adults. The findings of the study indicated that teachers with ten or more years of teaching experience perceived the training to be more learner-centered than did teachers with less than ten years of teaming experience and perceived the training to be teacher-centered. In the analysis of level of education in relation to perception, the results did not indicate that there was no relationship between the perception of principles in adult teaching and the level of participants' education.

Finally, although it might be expected that trainers who teach adults would be well versed in those principles that would enable them to teach adults effectively, the results of this study indicate that, in this instance, this was not the case. For the trainers of Project A and similar offerings, there appears to be a strong indication that they would benefit from professional development in the principles of adult learning. This study did not determine that the sole reason for the lack of learning the new skill was because of not using the andragogical model of instruction. One can speculate many reasons that may have attributed to these results such as the content of the professional development, the timing of the training, and the area of certification of teachers. Further studies were

recommended to determine more relationships between the andragogical model and adult learning.

APPENDIX A DESCRIPTION OF PROJECT A

Project A was a discretionary project funded by the Florida Department of Education to identify and disseminate information related to resources, professional development, and research in effective instructional practices. The purpose of the state-sponsored project was to provide professional development, products, and resources to ensure mastery of outcomes for students based upon effective established instructional practices delivered through professional development training sessions. Advisory boards that consisted of teachers, administrators, parents, state department representatives, and staff developers throughout the state developed the nomination and dissemination process of instructional practices. The goal was to create standards and a process for identifying and disseminating effective instructional practices within a school (Carnine, 1999).

The model of professional development within Project A was conceptualized and delivered in the context of a four-step, continuous improvement model, with each of the initiatives tied to the needs of the state and each individual school. The first step of the model was to identify research base effective instructional practices. Project A developed a set of criteria (Appendix B) to determine whether or not the effective instructional strategy was research based.

The second step in the continuous improvement model of professional development was the selection of practice and applicants. The selection criteria were developed to recruit teachers who had the potential to become and the interest in becoming trainers. Ultimately, the goal of Project A was to develop a cadre of trainers in this instructional practice to become local resources. Project A would then support those trainers through professional development on an annual basis. The third step of the professional development model was to provide that professional development. Project A at these trainings would help participants develop a plan of action to implement the strategy and provide limited resources, such as coaching and materials, to help the teachers implement techniques in their classrooms. Finally, the professional development model called for evaluation of the professional development and an evaluation of the impact of the professional development on student learning. The results of the evaluation were used to plan and formulate future initiatives or changes.

At the time of the study, Project A provided 32 trainings in Florida to 891 teachers. The operating budget of the grant year was \$1,050,792.75

APPENDIX B EFFECTIVE INSTRUCTIONAL PRACTICES CRITERIA

Level I: Theoretical Criteria

Indicate with Y or N whether the practice in the article meets the criteria listed in bold print. It is not necessary for all indicators to be met in order for a criterion to be met.

1. Practice is based on educational theory (established, emerging, or proposed).

 - The underlying theory is stated in the article.
 - The underlying theory is implied in the article
2. The practice can be supported with prior research.

 - Research cited is adequate to form basis for the article.
 - Research cited is clearly related to topic of article.
 - Research cited is from reputable (preferably peer reviewed) sources.
3. The practice has a clear purpose.

 - Purpose is stated in the article.
 - Purpose of practice is implied in the article
4. The practice has an appropriate target population.

 - Target population is of school-age (3-21).
 - If descriptors of target population are not current, they are cross-referenced to current descriptors or clearly defined
5. The practice has well-defined anticipated outcomes.

 - Anticipated outcomes (or hypotheses) are stated in the article.
 - Anticipated outcomes are related to state purpose, prior research, and theory.
6. Implementation of the practice results in positive student outcomes.

 - Results are described adequately in the article.
 - Effect sizes are fair to excellent.

_____ 7. **The practice is replicable.**

- Subjects are described in article.
- Measurement instruments are described.
- Procedures/activities are adequately described.

_____ 8. **The practice has face validity.**

- At first glance, it seems like a good idea.
- The practice appears free from cultural or gender bias.

_____ 9. **The practice has social validity.**

- You would not mind if someone implemented this practice with your child.
- This practice could be implemented in a community setting without concern.

APPENDIX C
PRINCIPLES OF ADULT LEARNING SCALE

Directions: The following contains several things that staff development training might incorporate when training adults. You may personally find some of them desirable and find others undesirable to be used in staff development training. For each item please respond to your experience in this training of the frequency of use of the described item in staff development training.

Your choices:

0-Always, 1-Almost Always, 2-Often, 3-Seldom, 4-Almost Never, and 5-Never. If the item does not apply to your experience, mark number 5-never.

On the space provided, mark the number that expresses your experience in this training of the frequency of the use of the described item in staff development training.

Always	Almost Always	Often	Seldom	Almost Never	Never
0	1	2	3	4	5

If the item does not apply to your experience, mark number 5.

- The training allowed participants to participate in developing the criteria for evaluating their performance in the training.
 The training used disciplinary action when needed.
 The training allowed participants more time to complete assignments when they needed it.
 The training encouraged participants to adopt accepted middle-class values.
 The training helped participants diagnose the gaps between their goals and their present levels of performance.
 The trainers provided knowledge rather than served as a resource people.
 The training adhered to the instructional objectives that were stated at the beginning of a training program.
 The trainers participated in the informal counseling of the participants.
 The training used lecturing as the best method for presenting the subject material to participants.
 The training room was arranged so that it was easy for participants to interact.
 The training determined the educational objective(s) for each of the participants.

- The different training sessions were planned so that they differed widely from the participants' socio-economic backgrounds.
- The trainers got participants to motivate her/himself by confronting her/him in the presence of other participants during group discussions.
- The training planned learning episodes to take into account participants' prior knowledge.
- The training allowed participants to participate in making decisions about the topics that were covered in the training.
- The training used one basic teaching method because most adults have a similar style of learning.
- The trainers used different techniques depending on the participants being trained.
- The trainers encouraged dialogue among participants.
- The training used written tests to assess the degree of academic growth rather than to indicate new directions for learning.
- The training utilized many competencies that most adults already possess to achieve educational objectives.
- The training used what history has proven that adults need to learn as the chief criteria for planning learning episodes.
- The training accepted error as a natural part of the learning process.
- The trainers had individual conferences with participants to identify their educational needs.
- The training allowed each participant work at his/her own rate regardless of the amount of time it took her/him to learn new concepts.
- The training helped participants develop short-range as well as long-range objectives.
- The trainers maintained a well-disciplined room to reduce interferences to learning.
- The training avoided classroom discussion of controversial subjects that involved value judgments.
- The training allowed participants to take periodic breaks during the training.
- The training used a variety of methods to foster quiet, productive deskwork.
- The training used tests as the chief method of evaluating participants.
- The training planned activities that encouraged each participant's growth from dependence on others to greater independence.
- The training geared instructional objectives to match the individual abilities and needs of participants.
- The training avoided issues that related to the participants' concept of her/himself.
- The training encouraged participants to ask questions about the nature of their society.
- The training allowed participant's motives for participating in continuing education to be a major determinant in the planning of learning objectives.
- The training had participants identify their own problems that needed solved.
- The training gave all participants the same assignment on a given topic.

- The training used materials that were originally designed for students in elementary and secondary schools.
- The training organized adult learning episodes according to the problems that the participants encounter in everyday life.
- The training measured participant's long-term educational growth by comparing her/his total achievement in the training to her/his expected performance as measured by national norms from standardized tests.
- The training encouraged competition among participants.
- The training used different materials with different participants.
- The training helped participants relate new learning to their prior experiences.
- The training taught units about problems in everyday life.

Please complete the following demographic for the school year 2000-2001:

Age _____ Highest Level of Education _____

Years of Teaching: _____ Teaching Subject: _____

Grade Level Taught: _____ Area of Certification: _____

APPENDIX D
TRAINING EVALUTION FORM

Please answer the following questions and provide any additional information which will facilitate the planning of future activities.

Math Initiative Summer Institute – June 25-29, 2001

Place a check in the box which best conveys your experience. Use the following scale for your responses.

5 – Excellent 4 – Good 3 – Fair 2 – Below Average 1 – N/A

	5	4	3	2	1
Overall quality of the training					
Overall quality of the presentations					
General organization of the event					
Time allotted to cover topics					
Opportunities for practice of new material					

1. What expectations did you have about this training?
2. What information will you use immediately?
3. What is the most important, relevant information you learned?
4. What information/topic was not included that would have been beneficial?
5. How do you plan to implement and or share the information presented?
6. How can Project A assist you to implement the information you have obtained?

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BIOGRAPHICAL SKETCH

Marjorie Campo Ringler was born in Hackensack, New Jersey, and moved to Florida with her family a year after her birth. At age 6, her family moved to her parents' native country, Colombia, S.A. Upon high school graduation at Karl C. Parrish in Barranquilla, Colombia, she returned to the United States to obtain her post secondary education and to work.

Marjorie earned a bachelor's degree in math education at Florida International University in Miami, Florida. She taught mathematics in Volusia county schools. After completing her master's in educational leadership at Stetson University in DeLand, Florida, she returned to Colombia where she taught math for a year at her alma mater high school. After this experience teaching abroad, Marjorie returned to Volusia County where she worked as an Assistant Principal at a local high school for 6½ years. Marjorie has been a faculty member in the College of Education at the University of Central Florida for 4 years and presently coordinates a professional development grant.

Marjorie is married to her husband, Ross, and together they have two daughters, Taylor and Victoria. She is the daughter of Miguel and Beatriz Campo Sanchez and sister to three brothers, Miguel, Javier, and Johnny.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.



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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.



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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.



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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.



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This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Education.

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